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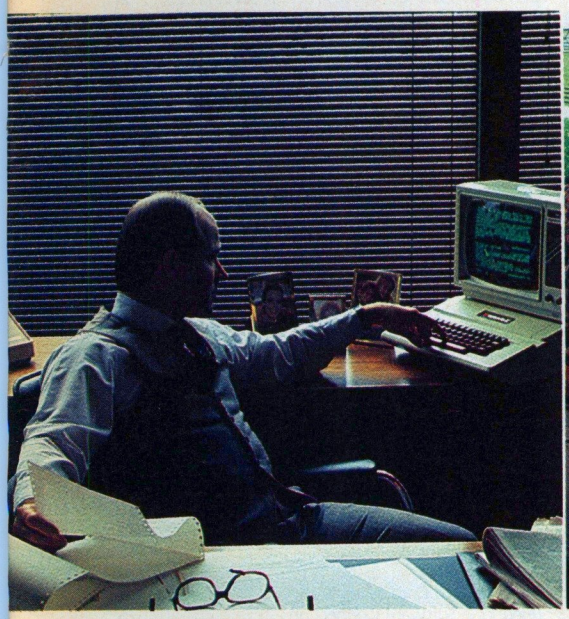

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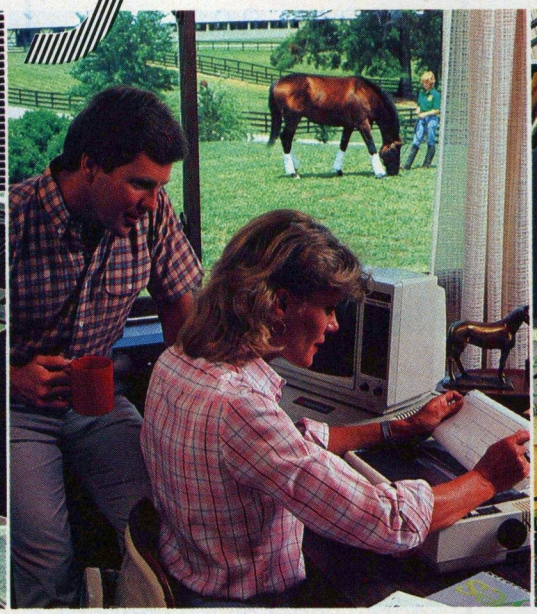

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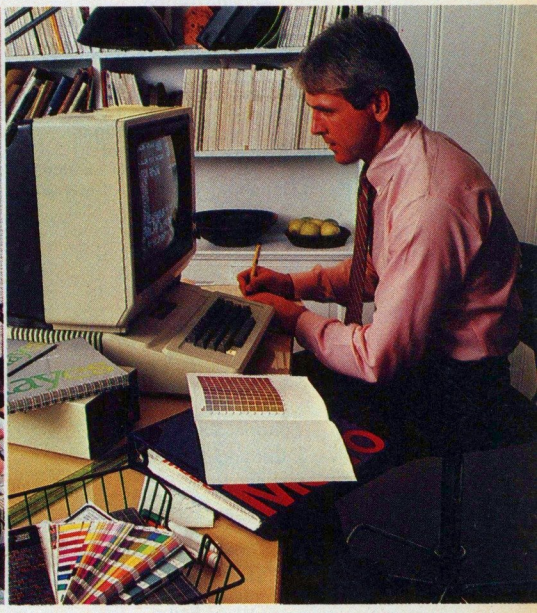

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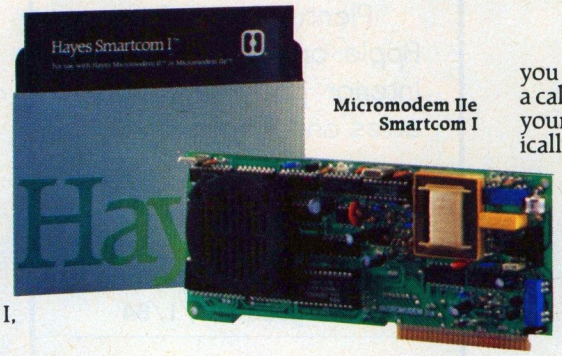

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This book is one of the best ways for anyone interested in learning machine language to get started. The book is a collection of the first 18 articles by Roger Wagner first published in the "Assembly Lines" column of Softalk magazine. Also included are many charts and tables not published in the monthly column. In addition to teaching you the beginning points of machine language programming, the book covers disk access, sound generation, screen techniques and more! **$19.95**

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THE EDITOR BYTES BACK

the editor

PRO-DOS is the newest Apple-related buzz word and refers to a brand-new hybrid disk operating system, sort of a cross (with respect to how the user perceives it) between DOS 3.3 and Apple /// SOS. It maintains most of the familiar 3.3 commands while adding the hierarchical pathname structure of SOS. Its biggest claim to fame is complete compatibility between the II and /// and various hard disk systems such as **ProFile.**

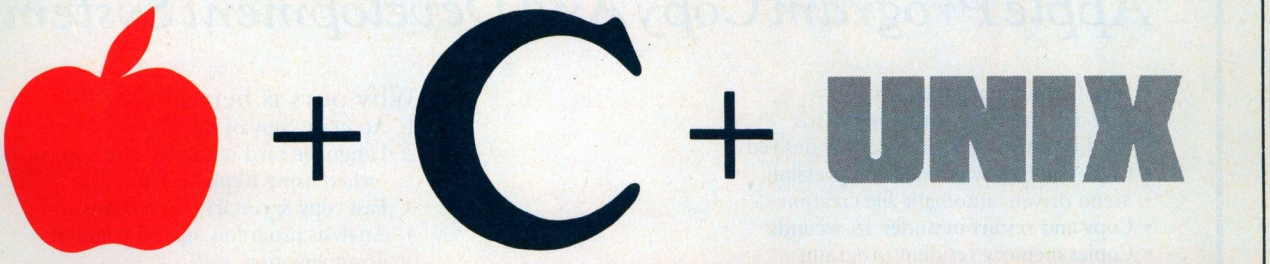
Gary Charpentier and **David Sparks** have spent many hours poring through preliminary manuals **Taking the "Pro" Out Of Pro-DOS** to prepare you for Apple's 1984 release.

Perennial **Ken Kashmarek** blooms again with the third part of **D is For Data: Down the Data Path,** his comprehensive tour of PFM data file structure, while contributing editor **Jonathan Post** concludes **Computer Futures** with **Exotic Technologies.**

Finishing up our cover and introducing our new business section, staff writer **David Sparks** takes you on a guided tour of spreadsheet files in **What's the DIF.** Our business section also introduces **Mike Regeimbal,** who will pilot **Strictly Business,** a regular monthly column which will cover all aspects of business computing. Mike will tell you more about it in his opening paragraphs.

Also in this issue, **Jeffrey Jacques** concludes **Spreadsheets in the Classroom** for our education section, and **Health Aide** and **The Printographer** are two software reviews to be found in the review section.

Lastly, fear not, **Bruce Field** and his popular **Apple Doctor** have not disappeared; he will be back next month. Oh yes, we would like to congratulate Bruce, who captured the number one spot in our July readers choice returns, and will be the recipient of a $100 check. At the same time, **Brett Heap,** member number 16455 was the lucky winner of $100 worth of A.P.P.L.E. products in our July issue drawing held September 20th. Remember to keep those readers choice cards coming in; you may be the next winner!



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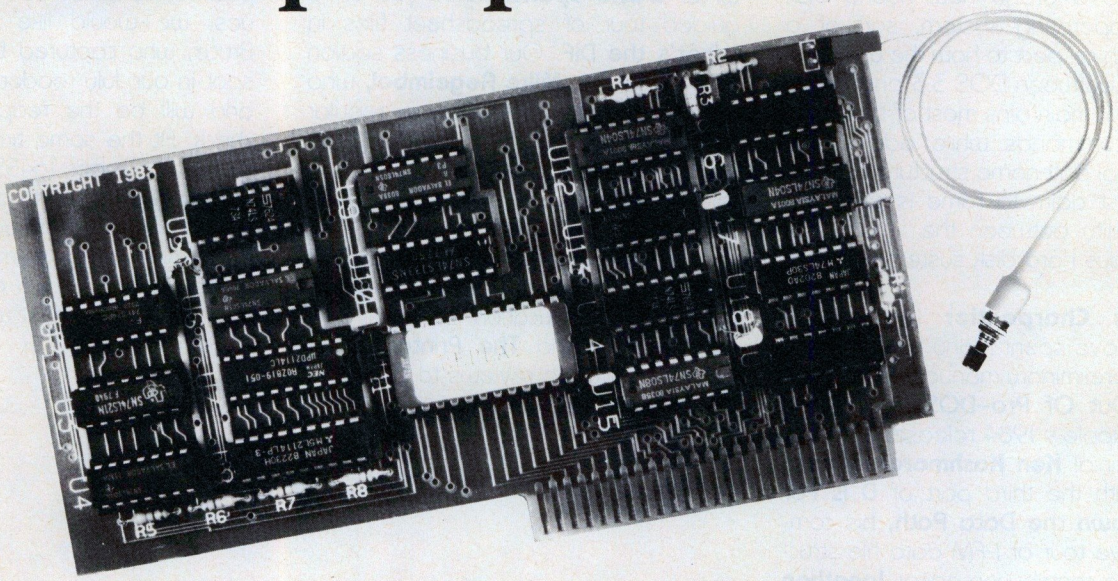

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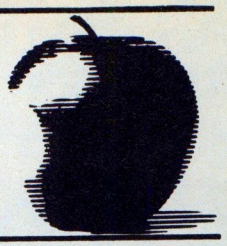

Val J. Golding

CHIDE, *v.t.,* to scold mildly. (Thanks, David.) We enjoy words. We enjoy taking the time necessary to choose exactly the right word to convey our meaning, to shade our palette properly. Non-words often have special significance as well, wherein the real message is that which does not appear. Examples of both may easily be found in diplomatic language and government press releases. All of which is a roundabout way to introduce our subject.

Cost effectiveness, a pair of words we shan't define, but which has meaning for all of us. We try our very best to make A.P.P.L.E. a cost-effective organization. Each month we enroll several hundred new members, thus we are constantly growing and expanding and, as one might expect, not without some minor growing pains. Early this year we moved to our present 20,000 square foot facility at Kent, Washington, a Seattle suburb. Shortly thereafter we took delivery of an IBM mainframe, our largest single expenditure ever, all to improve the quality of service to our members, to expedite their orders, to more efficiently serve them. More recently we installed an 800 toll-free telephone for orders, eliminated the multiple hot-line telephone numbers and relocated the editorial department to our Kent general offices.

Each of these steps have resulted from carefully planned studies to keep member costs down, yet none is without penalty. New addresses, new phone numbers, procedural changes, "icky" product codes and the like, still we must live with them. We have tried to implement each change as painlessly as possible and have tried to keep you aware of them in *Call -A.P.P.L.E.* and in our product catalogs.

If we were asked the single most important thing a member should be aware of, we would say the difference in time zones and secondly the correct telephone numbers. In this area, members can improve their own cost-effectiveness. Daily we note calls to the wrong number or at the wrong time which cost the member an unnecessary toll charge and a call back for the desired information.

Page two of every issue of *Call -A.P.P.L.E.* always lists current information on office and telephone hours and numbers; we urge you to check it each time. Office hours are from 9am to 4pm, Monday through Friday, except for national holidays and the period between Christmas and New Years. These hours are in Pacific time. If you live in the Eastern time zone, subtract three hours. For the Central and Mountain zones, subtract two and one hours, respectively. The telephone number is (206) 872-2245. If you call after hours, you will reach our answering service, an independent organization which can only take messages or accept orders. *They do not have knowledge of our product line nor access to our order processing system,* thus are unable to answer any questions.

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Our consultants are an important adjunct to the hot-line. Their names, numbers and specialties may be found on the handy tear-out card in each issue of *Call A.P.P.L.E.* Often you may be able to find one close to your area that can assist with a particular problem. Our consultants are all unpaid volunteers, so please be courteous and carefully check the time zone before placing a call.

The *A.P.P.L.E. Crate Bulletin Board* is a 300 baud, full duplex telecommunications information exchange operating 24 hours daily, available to members and the general public alike. Each user will be assigned a *userid* which will be validated by telephone before full access is allowed. When applying for an ID, be sure and leave a valid *voice* telephone number where you can be reached for verification. Inactive users will be purged after 30 days without a logon, so that new users may apply. In consideration of others who wish to use the system, we request that you limit your calls to 15 minutes or less. Peak hours of use are from approximately 6pm to midnight, *Pacific* time, thus you may find it easier to get through at other times. If you have a modem, you may access the *A.P.P.L.E. Crate* at (206) 935-9119.

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A **Call -A.P.P.L.E.** TUTORIAL:

Taking the "Pro" Out of ProDOS

Gary W. Charpentier with David Sparks

APPLE Computer's new Professional Disk Operating System is expected to be released in early 1984. It will allow the Apple][family of computers to use higher-capacity disk drives and produce data disks which are directly readable by the Apple *III* Sophisticated Operating System. Data transfer between disk and memory is eight times faster than DOS 3.3. It allows increased data and program storage capacity on current diskettes.

ProDOS, as the new system is called, accomplishes this improvement of the Apple][without requiring modification of most existing Applesoft programs using DOS 3.3 in the standard way as described in the DOS 3.3 handbook.

This article is based on extensive evaluation by Gary Charpentier of his pre-release version of ProDOS. The package we received includes two diskettes and draft copies of three separate user manuals. One diskette contains a collection of utility programs, and the other a set of files of various kinds illustrating the uses of ProDOS.

One of the manuals describes the two diskettes and documents the utilities. The second is a technical manual on ProDOS. It is quite detailed and should provide hours of enjoyment for assembly language buffs. The third documents something called SYSTEM.BASIC, which is how ProDOS connects with Applesoft. This manual details the ProDOS commands you would normally use.

We ask you to wait until the end of the article to decide whether you like the sound of ProDOS. We're going to describe, more or less in this order: the changes you will notice in ProDOS compared with DOS 3.3, the new features ProDOS gives to Applesoft, the kinds of programs which probably will need alteration to work with ProDOS, and the benefits we think you might obtain from switching to ProDOS.

We don't have room in this introductory article to elaborate on technical, internal information about ProDOS, nor on its use from assembly language. Apple has made less of a secret about these matters than it did with DOS 3.3. However, you may expect much more to be written about this fine, new operating system in the months ahead.

ProDOS comes in two parts. On a bootable disk, there will always be a file called "PRODOS." It contains the code that handles the disk operations which corresponds to the so-called RWTS and File Manager portions of DOS 3.3. (For a description of DOS 3.3, refer to Lechner and Worth's *Beneath Apple DOS.*)

The code in "PRODOS" includes something called the Machine Language Interface, a well-documented way to allow other assembly-language programs to use the disk operations of ProDOS. This ability is then employed by a second file, called "BASIC.SYSTEM".

"BASIC.SYSTEM" makes the connection between Applesoft and ProDOS. It provides all the disk-related commands and also some enhancements to Applesoft itself. The DOS changes we describe here are a part of "BASIC.SYSTEM".

DOS Changes

INIT does not work. Its function has been moved to one of the utility programs on the master disks. If you or your program issue an INIT, you will get a SYNTAX ERROR. You will want to be sure you have some extra, formatted disks on hand at all times, because you can't initialize one while a program is running.

This is because ProDOS will allow you to hook up a mixture of disk drives with different capacities, all the way from the present Disk][to the 5-megabyte ProFile hard disk and other sized drives which may be marketed by Apple or other vendors. Each will require its own formatting program.

Incidentally, a newly formatted disk volume under ProDOS does not have a copy of "PRODOS" or "BASIC.SYSTEM" taking up space on it. It is almost 100% useable for storing programs or data, but can't be booted. If you want a bootable disk, you merely place "PRODOS," "BASIC.SYSTEM" and a "STARTUP" file onto it. "STARTUP" has to have that name but can be a basic program, a binary program, or an EXEC file.

Because "BASIC.SYSTEM," the go-between, is Applesoft-related, it does not recognize Integer Basic. Therefore the INT and FP commands of DOS have no function, and return a SYNTAX ERROR.

MON and NOMON have no function in ProDOS. But, if you or your program issue these commands, you will not get an error message; the commands will simply be ignored.

MAXFILES also has no function. It is no longer necessary to allocate file buffers prior to opening the files.

—●→

TAKING THE "PRO" OUT OF PRODOS

ProDOS takes care of that for you "dynamically," or as-needed when the OPEN command is given. If your program has a MAXFILES command, it will not generate an error message. But you will not be able to have more than eight files open at once. DOS 3.3 permitted up to 16 simultaneously active files. Sparks says he can't count that high anyway.

CATALOG puts out an 80-column display including file name, type, length, date created, date last handled, file length, record length on random-access files and starting address on binary files. If you don't need all this information, a new command called CAT gives an abbreviated report in 40 columns.

The file types are as follows:

Applesoft program	BAS
Binary	BIN
Directory (new)	DIR
System file (new)	SYS
Text file	TXT
Variables (new)	VAR
Integer BASIC program	INT

You apparently can have Integer files on a ProDOS disk, but there isn't a way to RUN them under ProDOS at present.

Pathnames

This brings us to an important difference between DOS 3.3 and ProDOS: "pathnames," or how files are "filed." Disks initialized under DOS 3.3 have a volume number. Disks formatted under ProDOS have a name. If you have a program that uses volume numbers to identify disks, you will have to change the numbers to names in order to use it with ProDOS.

A "volume" is an entire disk; a ProFile hard disk (equal to 35 floppies) is a single volume. Each volume has a directory, which can record the names of up to 51 files. If you ask for a "CAT" by volume name, ProDOS will check every drive online looking for it. This is much more convenient than DOS 3.3, which requires you to know the slot and drive of the directory you want to see.

The volume name is the "pathname" to the main directory of the disk. It also allows a very important idea, old hat to Apple *III* users but new to most of the][community: the sub-directory. Consider a volume (a disk) named "WORDS," on which you keep your word-processing files. You have family mail, letters to clients, and magazine articles on this volume. The sub-directory gives you a way to CATALOG only one category of files, by grouping them into a sub-directory. We'll tell you how in a minute; assume for now that you've already arranged things that way.

When you wish to see the volume directory, you don't type "CAT,D1" because you don't want to be bothered making sure WORDS is in Drive 1. You just type "CAT /WORDS" and ProDOS takes care of finding which drive it's in. The directory appears. Instead of a jumbled list of files including family mail, client mail, and articles, you see just these entries (of which we show a part here):

```
WORDS
    FAMILY              DIR
    CLIENTS             DIR
    ARTICLES            DIR
```

You've probably already figured out that DIR means a sub-directory under WORDS. It's as though you opened a book containing printouts of all the files on the disk, WORDS. The first thing you find is a table of contents breaking the volume down into several parts. You've probably also figured out that each of these parts is going to have its own table of contents, or directory.

To read the directory of the family letters, you would type "CAT /WORDS/FAMILY." ProDOS finds the drive containing WORDS, then the sub-directory FAMILY. Here is a partial display you might get:

```
FAMILY
    MOTHER.01  TXT  6/7/83
    COUSINS    TXT  7/4/83
    MOTHER.02  TXT  10/29/83
```

That business about "/WORDS/FAMILY" constitutes the pathname to this particular directory. Suppose you decided to revise that last letter to Mom before sending it. Your word processing program could access it with the pathname "/WORDS/FAMILY/MOTHER.02." There are shortcuts so you don't have to enter the entire pathname each time. We'll get to those.

You don't have to use pathnames; just keep less than 52 files on any one disk. Try them a while before you make up your mind. They "kinda grow on you."

ProDOS alters the effects of many DOS 3.3 commands; your existing program won't notice most of the changes, but you'll find use for them in future applications.

VERIFY now only checks to see if the filename (excuse please, the pathname) exists. Under DOS 3.3, it would also check that the data could be read from the file. Since most programs have come to use VERIFY only to determine if a file exists, this is the function which survives.

PR# and IN# got a thorough working over. It is still alright to use them in immediate mode. It is OK to issue them when preceded by a [Ctrl-D] in a program. But in DOS 3.3, if you issue PR# or IN# in a program without the [Ctrl-D] it will connect you to the indicated slot, and *disconnect* DOS.

ProDOS is jealous — it wants to stay connected. So if your program issues IN# or PR# without a [Ctrl-D], ProDOS will ignore the order. It won't activate the indicated slot. It won't disconnect itself. And it won't signal an error.

If you have a peripheral requiring special "driver" routines, you need to "hook" them into the scheme of things. In DOS 3.3, special procedures were necessary to advise DOS of these "drivers".

ProDOS provides an alternate, simpler way to meet the needs of special driver programs for input and output. IN# and PR# can now be issued with the address of the special driver routine. If your printer driver runs at $300 (and it subsequently handles getting data to the actual slot) then you can say "([Ctrl-D]) PR#$300." That will connect your printer driver to ProDOS, and until you instruct otherwise, ProDOS output will go to $300 in memory for final disposition.

Of course, "([Ctrl-D])PR#1" will still take care of things where the driver is in the firmware of the card in Slot 1.

ProDOS therefore neatens I-O handling in two ways: clear calls to slot or special driver addresses, and no more accidental disconnection of the Operating System.

RUN is improved. ProDOS allows you to specify a line number. You've always had this ability for a program in memory. You could say RUN 100 or RUN 5150 to start program execution other than at the beginning. Now you can do the same for a program on disk. The new line number parameter is the "@" character, for "at." An example of its use to start executing a program named "BINGO" at line 100 would be, "RUN BINGO, @100".

There are two, delightful newcomers to the RUN family of commands.

CHAIN lets you run consecutive programs without losing the variables in memory. Here's a trivial example:

```
1 REM PROGRAM.A
10 A$ = "THIS IS A TEST"
20 PRINT CHR$(4);"CHAIN
   PROGRAM.B"
```

And meanwhile, on disk, you have already saved:

```
1 REM PROGRAM.B
10 PRINT A$
20 END
```

When you RUN PROGRAM.A you get some disk action, then up on the screen appear the words, "THIS IS A TEST." When you then LIST the program in memory, all you see is PROGRAM.B.

You can CHAIN to a specified line number, just as with RUN.

The other new member of the RUN family is the single character, "-". This is pronounced DASH (faster than RUN, see?), and can be used for *any type of file.* It will attempt to RUN an Applesoft file, BRUN a binary file, or EXEC a text file.

Of course, you can get as crazy with this as you wish. Remember that letter to Mom a while back? If you instruct ProDOS to "-/WORDS/FAMILY/MOTHER.02" you'll be in for some pretty interesting experiences. (Unless you only write things to your mother that are executable computer instructions, in which case we will assume that you *already have had* some pretty interesting experiences.)

EXEC is the ProDOS command directing the Apple to take instructions from a text file on disk. It works the same as in DOS 3.3, but there is an addition. Each statement in the file is a "field," and the ProDOS EXEC command allows you to skip a number of "fields" at the start of a file before commencing execution. You do this with the new ",F" parameter.

Remember Applesoft Preserves in these pages a year or so back? The idea was to allow you to park your variables somewhere safe while editing your program, then get them back to test the changes you made. It was such a good idea that ProDOS now does that for you. Two new DOS commands, STORE and RESTORE, respectively tuck your variables away and summon them back.

You may also find this useful with very long-running programs. Arrange to have them check regularly for a signal that you want to halt processing. A game could have a pause option. Other programs could look for a keypress. You or the program could then STORE the variables. Later, you could LOAD the program, RESTORE the variables, and GOTO a line number where processing should continue.

The draft of the manual we received said you could RUN the program to pick up where you left off; we tried that, but RUN still *clears all the variables* as it has always done. We're going to say that the manual will need some polishing by Apple on this point.

Keep in mind that a command is a ProDOS command if it is issued in immediate mode, or preceded by a control-D (CHR$(4)) in a program. ProDOS commands STORE and RESTORE move *all* of a program's variables to and from a VAR type file on disk. STORE without control-D is an Applesoft command, which writes a single, specified array to tape. Its companion is RECALL, which reads data into an array from tape. Don't mix these up.

The new PREFIX command is the secret to easy use of pathnames. Going back to the WORDS volume name, wouldn't it be nice to simply refer to that letter home as "MOTHER.02" instead of "/WORDS/FAMILY/MOTHER.02"? What you do is use the ProDOS PREFIX command: "PREFIX /WORDS/FAMILY." Then when you type "CAT," the directory displayed is the FAMILY one, and files in that directory can be referred to by their file name only. ProDOS adds the PREFIX for you to any pathname which does *not* begin with a slash, "/".

Want to know what the PREFIX is at any given time? Just type "PREFIX" by itself, and you'll see it. Want to eliminate the PREFIX altogether? Just type "PREFIX /".

Apple suggests that each program which uses files have a sub-directory of its own, in which the program and its related files are the only entries. Since sub-directories can have sub-directories within them, this arrangement can exist for hundreds of programs. A program wouldn't need to contain long pathnames to find its files, because you would have already set the PREFIX to that program's sub-directory.

On a large disk you could have many programs with data files named "DATA FILE." If each one is in its own sub-directory, you'll never have any confusion as to whose data file is whose.

If you need to create a new sub-directory, then the ProDOS command CREATE should take care of you. That's how you would have gotten the sub-directories "FAMILY","CLIENTS," and "ARTICLES" into the "WORDS" volume directory in the first place. You would have instructed ProDOS to "CREATE /WORDS/FAMILY." Or, if you had previously set "PREFIX /WORDS" then you would have simply said "CREATE FAMILY".

File handling in Applesoft programs will work as it has always done, especially if you follow Apple's advice of having a sub-directory for each set of programs and associated data files. Your existing programs should function normally under ProDOS.

TAKING THE "PRO" OUT OF PRODOS

As you might expect, however, much has been added in ProDOS that should make your life more pleasant. Topping the list has to be the increase in speed; ProDOS moves data between Apple and disk up to eight times faster than DOS 3.3.

Text Files

Every command dealing with text files has been changed, as well as certain of the parameters that go with them.

OPEN has only one change, involving random access files. In DOS 3.3 it was necessary to declare the record length as a part of the OPEN in order for DOS to recognize the file as random-access. With ProDOS the record length need only be given when the file is first created. From then on, ProDOS recognizes the file as a random-access text file, and *remembers the record length.*

OPEN requires the full pathname of your file, which means this: if you have set the PREFIX, you can get by with just the file name; if you later change the PREFIX, you'll need to provide OPEN with the entire pathname of the file.

On our example volume, "WORDS," we've made it easy to access that letter to Mom by setting the PREFIX to "/WORDS/FAMILY." That way, we only need to "OPEN MOTHER.02." But if we later change the PREFIX to "/WORDS/ARTICLES", then to access Mom's letter we would need to instruct ProDOS more fully, "OPEN /WORDS/FAMILY/MOTHER.02".

The Slot and Drive parameters are still available as options for OPEN, but you'll not need them if you take up the use of pathnames.

WRITE has an added parameter, the so-called "Field" parameter, ",F". Whether sequential or random-access, a text file consists of "Fields" each of which may contain one or more "elements." A "Field" is a string of characters terminating in a carriage return (CHR$(13)). An "element" is one or more characters on the disk terminating either in a comma or a carriage return. Elements are numbered from zero upward within a field. Fields are numbered from zero upward within the file, in the case of sequential files, or within a record, in the case of random-access files.

The ",F" parameter used with WRITE instructs ProDOS to skip over a given number of fields before putting anything new into the file. The draft manual gets high marks for its clear explanation of this change, and the illustrative programming examples.

READ uses the Field parameter in the same way as WRITE. For both READ and WRITE the random-access record-number parameter, ",R," works as in DOS 3.3.

The Byte parameter differs from DOS 3.3. In DOS, the ",B" parameter would begin processing the file at the *ABSOLUTE* byte position given, without regard to the position-in-file pointer. In ProDOS the ",B" parameter starts file processing at the *RELATIVE* byte position "downstream" from the position-in-file pointer. This is a subtle but important difference, and you need to carefully examine any programs you transfer from DOS 3.3 which make use of the Byte parameter in WRITE or READ.

Note that the addition of the Field parameter to the WRITE command means there is no need to use the POSITION command between the OPEN and the WRITE. The POSITION function is now performed by the WRITE command in response to the F, or Field parameter.

POSITION in ProDOS isn't really necessary, but Apple left it there to avoid problems with existing Applesoft programs. POSITION will accept either the ",F" parameter of ProDOS, or the old ",R" parameter of DOS 3.3. Both convey the same information to POSITION. Frankly, you'd be better off to get rid of it, and install the ",F" parameter in your READ and WRITE statements.

On further reflection, we can see a reason for continuing to use POSITION, in those rare instances where it ever might be used. For a time there will still be a lot of Apple][owners using DOS 3.3 exclusively. Good business sense dictates that you write any program you plan to sell so that it can run either in ProDOS or DOS 3.3. That thought applies alike to all these other ProDOS expansions of existing DOS commands.

APPEND now works with random-access files. *ProDOS keeps track of the location of the last byte of a file;* DOS 3.3 doesn't. That means that APPEND can go directly to the end of both sequential and random-access files, to add either another field or another record, respectively.

ProDOS performed an APPEND to a 30,000-byte file in three seconds. An identical APPEND took DOS 3.3 a full minute. DOS 3.3 *requires* a WRITE command following APPEND, whereas it is *optional* in ProDOS, which performs an automatic WRITE.

FLUSH is the new text-file command. ProDOS handles data in 512-byte "blocks." You can have a lot of data sitting in the file buffer in memory that hasn't been sent to the disk yet. FLUSH makes sure it all gets out there. It will come to be regarded as good practice to FLUSH your files regularly.

CLOSE works just as it does in DOS 3.3. It does an automatic FLUSH before closing a file. Issued without a pathname, it will close all files.

Binary Files

ProDOS really improves the handling of these files in two ways. New parameters make all three binary file commands more flexible. In addition, BSAVE and BLOAD can now be used with *any type* of file.

In DOS 3.3, when you BSAVE a file you must specify the address in memory where the bytes to be saved begin, and the number of bytes to be saved. These were the ",A" and ",L" parameters, respectively. ProDOS adds some more.

The ",E" parameter can be used in place of the ",L" to indicate the address of the last byte to be saved. That saves you from having to do a hexadecimal subtraction problem.

The ",B" parameter allows you to put the first byte you're saving somewhere "downstream" from the first byte in the file. Suppose you were creating a file of High-Res pictures. Each image is $2000 bytes long. You would save the second one in file named "PIX" with the command "BSAVE PIX, B$2000, A$2000, E$3FFF".

If you've filled a memory area with ASCII characters and you want to make a text file out of them quickly, you can use BSAVE to do it. The new parameter making this possible is the ",T" or Type. To save the characters into a text file named "MESSAGE," you would instruct ProDOS to "BSAVE MESSAGE, A<starting address in memory>, L<byte count of characters>, TTXT". Our version of ProDOS requires that the text file exist before allowing BSAVE with the TTXT parameter. It is a simple matter to "CREATE MESSAGE, TTXT" first.

BSAVE still may use the Slot and Drive parameters, but with pathnames these fade into antiquity.

BLOAD uses the same parameters. By careful declaration of the ",B", ",S," (",E" or ",L") and ",T" values, you can load any number of bytes from any type of file into any part of memory as long as you don't try to trespass on any parts of memory ProDOS reserves for its own operations.

BRUN has all the parameters of the other two except ",T" as it wouldn't make much sense to try to BRUN a text or Applesoft file. If you are determined to try it, BLOAD the file first then CALL the starting address.

Don't call us to put out the fire.

Applesoft Changes

ProDOS is intimately involved with Applesoft through the good offices of the system program called "BASIC.SYSTEM." This package requires 64K of memory to run, but with 16K memory cards getting so cheap, why not?

BASIC.SYSTEM introduces to your Apple something called the Applesoft Command Interpreter, or "CI." The CI earns its keep, in our opinion, by doing several things you always thought DOS ought to do.

TRACE, that nice debugging tool provided in Applesoft ROM, doesn't work with DOS 3.3 without careful application. ProDOS, thanks to the CI, gives it back to you. Naturally, NOTRACE now works as well.

We already discussed the fact that PR# and IN# issued in a program, without benefit of a preceding control-D, won't work. The CI intercepts these commands *and ignores them.*

HIMEM needs special handling by you when used in the ProDOS environment. *Be sure it is an even "page" boundary;* only declare HIMEM values that are evenly divisible by 256. Failure to do this can cause ProDOS to get loused up when opening and closing files. Peculiar — in almost every other way ProDOS takes great pains to avert your accidents, but not here.

> At press time, a ProDOS update from Apple adds a new command, FRE, to the command table. As a result, MON will now return a SYNTAX ERROR, contrary to the information given on page 9. There is no change to NOMON. We hope to discuss the new FRE command at a later date.
>
> Changes to HGR, HGR2, and TEXT outlined in the preliminary manual have *not* been, and will not be implemented.
>
> A technique has also been developed to install fully protected machine language programs at fixed locations above HIMEM, using only a simple load, store and call.

Have you ever encountered "garbage collection"? If you are doing a lot with strings in a program, or handling your input with repeated GET instructions, sooner or later your program will appear to "hang" for a protracted time. You'll think your computer died and went to heaven. But no, it's just the Applesoft "garbage collector" painstakingly sifting through mountains of used strings to find and keep only the currently "active" string data.

Applesoft's routine to do this is in the ROM chips. It can take 15 minutes or more in a truly bad case. The Applesoft Command Interpreter of ProDOS takes over this job and gets it done in a few seconds. True. Charpentier tested it.

When you think about it, ProDOS needs to take on this job. Earlier we said that it "dynamically" allocates a file buffer in memory when a file is opened. It does this by moving HIMEM down 1024 bytes. But that's where Applesoft puts its strings, just under HIMEM!

Also, ProDOS sometimes moves program lines and variables in response to HGR or HGR2, as described above. Doing that could clobber strings unless some provision exists to keep memory tidy.

The STORE command lays hands on all four variable types: strings, reals, integers, and functions. So it's no surprise that ProDOS inherits the job of Applesoft garbage collection. Surprise or not, the speed of it still takes the breath away.

What Doesn't Work Right Now

Programs which use custom Disk Operating Systems won't work with ProDOS any more than they did with DOS 3.3. Copy-protected programs that can't be transferred won't work.

Any program that uses PEEK, POKE, or CALL to "get into" the actual DOS 3.3 code won't work. *ProDOS is totally new code.* Same thing for machine language programs that JSR into DOS, including those using the famous "Page 3 DOS Vectors," *nearly all of which are eliminated.*

The version we received "points" the Applesoft Ampersand command, "&", to a brick wall in the System Monitor. This is to let you know clearly that you did not initialize the ampersand "vector" at $3F5. DOS 3.3 "pointed" the ampersand to an RTS in the Monitor, so that programs that failed to initialize $3F5 often got a mystifying SYNTAX ERROR.

Programs that locate themselves up in DOS, on the Language Card, or between DOS and its buffers probably won't work, since ProDOS uses those locations differently. Such things as GPLE, Big Mac.LC, and who knows what all else need work before they'll function with ProDOS.

Fringe Benefits

Remember all those articles in *Call -A.P.P.L.E.* publishing cute little routines to "patch" DOS, add new commands, take away others? How tricky they were at finding the odd seven or twelve unused bytes in DOS to occupy! No more. The Applesoft Command Interpreter provides a gold-plated, guaranteed way to add new commands to your heart's content. Read it in the technical manuals, or keep an eye on this magazine.

ProDOS will use the extra memory on an extended 80-column card in a *IIe* as a RAM-based mini-disk volume named, appropriately, "/RAM." That's a free goodie.

TAKING THE "PRO" OUT OF PRODOS

The pathname approach to files is a watershed sort of thing. Those who are accustomed to DOS 3.3 will have to spend some time getting used to it. Those for whom ProDOS is their first Apple operating system will have no more trouble with it than you or we did with DOS.

Keep an open mind, and think about the alternative when accessing data on one of those large-capacity hard-disk drives. Do you really want to see a CATALOG with 3500 file names?

Utility Programs

The pre-release version of ProDOS comes with two diskettes. One has some examples of how to use ProDOS in conjunction with Applesoft. We've pretty much covered what it illustrates. The other disk gives you some much-needed utility programs.

FID's counterpart is the FILER. It takes care of disk volume initialization, transfers among ProDOS volumes, and wholesale file transactions such as locking, unlocking, or deleting groups of files.

MUFFIN's cousin is CONVERT. CONVERT moves files between DOS 3.3 and ProDOS disk volumes, in either direction. It'll balk at moving random-access files, as we found out when trying to CONVERT an EAMON diskette. There's a *Call -A.P.P.L.E.* Technote idea: how to make your random-access files acceptable to the CONVERT program. Prospective authors take note.

There's a third, interesting utility called the EXERCISER. This one has to do with learning more about the Machine Language Interface of ProDOS. You'll be hearing more about the MLI as time goes along. A lot more. But we can tell you something about it within the scope of this article, and do a little dreaming about what it can mean to you. Even if you aren't interested in machine language, we expect you'll receive substantial benefits from the MLI in the next year or two.

Dawns a New Day

ProDOS is really an implementation on the Apple][of the Apple *III*'s Sophisticated Operating System, or SOS. There are many differences, but the basic idea is the same. The MLI of ProDOS has a look-alike in SOS. ProDOS, during the bootup process, can tell if it's in an Apple *III*; if so it will try to shift control to SOS.

Think about this for a minute. There are hundreds of thousands more Apple][-family computers out there than there are Apple *III* computers. People who write major applications programs nowadays do so in machine language. This is time-consuming and expensive. Programmers and publishers are interested in producing software for the largest possible market, but up until now the Apple *III* hasn't been high on their list.

ProDOS is so much like SOS that a single "source file" with "conditional assembly" can yield two programs: one to run with ProDOS and another to run with SOS. Both can be on the same disk. Because ProDOS passes control to SOS when it finds itself in an Apple *III*, a single disk will be bootable on either a][or a *III*. The appropriate version of the program will come up running.

SOS uses pathnames exactly as ProDOS. Data files stored by ProDOS can be read by SOS directly. There is no need to put the Apple *III* into "emulation mode." *This is important.* With ProDOS, your data will be stored so that it is equally available to an Apple][or an Apple *III*, which was not the case with DOS 3.3.

We believe there is a better-than-even chance that software developers will begin producing such dually-bootable program disks. The data file structures will be identical on either machine. We think people who have an Apple *III* at work and a][at home will generate adequate demand for serious software they can use on either machine.

As data accumulates, it becomes the most valuable component of a computer system. Software sellers will recognize a step-up market for people wanting to upgrade their hardware, but keep their data.

We think we're already seeing signs of the interest serious programmers have in the MLI. Lechner and Worth are rumored to be feverishly at work on a sequel to their *Beneath Apple DOS* named, (Oh, how did you guess?) *Beneath Apple ProDOS.* They're said to be converting their *Bag of Tricks* utility disk to ProDOS.

Charpentier has already developed a ProDOS disk access utility, and expects to have a Universal Translator running by the time you read this. His program will transfer files from DOS, Pascal, and CP/M disks to ProDOS. Look to A.P.P.L.E. for "PROZAP," coming soon.

To the user, ProDOS isn't much different from DOS 3.3, except that it is eight times faster, handles much larger files, works with truly huge disk drives, can find a file by name in any drive, and one thing more. ProDOS makes the Apple][immediately more valuable because it can share data disks with an Apple *III*.

ProDOS has the potential to extend the productive lifetime of both the][and the *III*. If the editorial policy of *Call -A.P.P.L.E.* will permit, we'll state that this is one enhancement for the Apple][we hope and believe everyone will buy.

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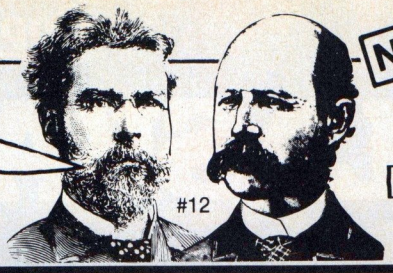

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SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.
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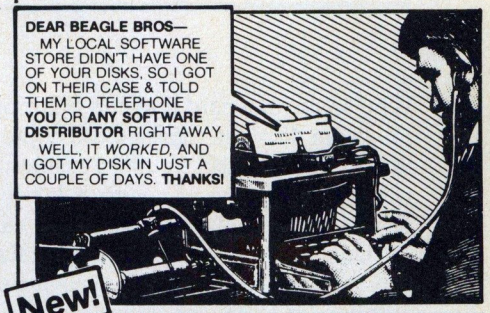

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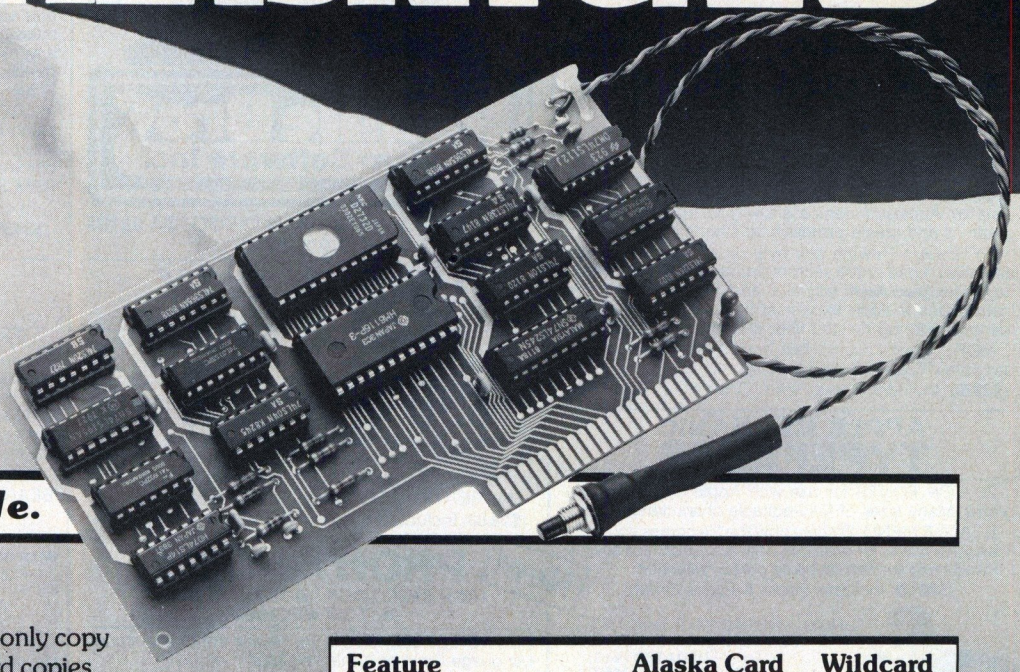

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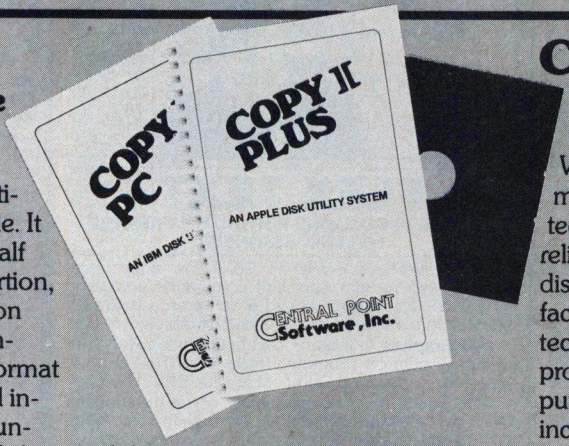

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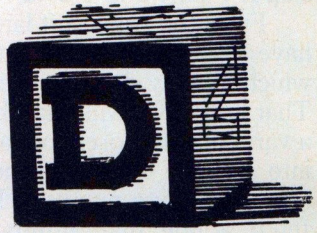
D IS FOR DATA:

Down the Data Path



Ken Kashmarek/Call —A.P.P.L.E. staff writer

WELCOME back to the real world of data! Since our last episode, there have been some interesting happenings in the land of PFM.DATAFILE. From our first installment, we all saw how Personal Finance Manager (PFM) stored binary data (Applesoft internal formats) in a DOS text file, except the text file could no longer be processed by Applesoft (not without some help, anyway). Last time around, not only could we copy the PFM data file, but any other file type as well using &OPEN/CLOSE and &READ/WRITE. So far, so good, but we still have to get at the data values. Well, this month, we are going to get at the data. We will use a super PEEK and POKE to manipulate data in the file buffers. But first, a short detour...

There's A Muddy Road Ahead

In part 1, I mentioned that PFM uses binary data formats for efficiency in program execution and disk space. In one of the attempts to create a reduced form of PFM.DATAFILE, only 113 sectors were needed to store the 281 sector file. This was done by eliminating all empty sectors (data sectors without monthly check entries). Interestingly enough, a DOS format text file of this same data took only 111 sectors. Whoa! Say what?

It turns out that the DOS text file also contained only the minimal data necessary to recreate the data file for PFM to process. However, it takes more than twice as long to sequentially process the DOS text file version of the same data. And randomly, of course, the DOS text file is useless. The DOS text file contained many zero data values (one character plus comma or carriage return) and all character values had trailing blanks trimmed. A full PFM.DATAFILE still takes less disk space than the corresponding DOS formatted text file.

Part 1 also indicated some unknown use fields in the base data area of PFM.DATAFILE. It turns out that some of these fields do get used, and the values must be carried along for PFM, otherwise you might get incorrect results. One other PFM anomaly: the monthly dollars spent is a sum of expenditures from checks written, credit card purchases, and cash purchases. Checks written to pay credit card bills go against a special account, "CC," and do not go into monthly dollars spent. This will be covered in part 4, so for now, let's get off the muddy road and back to the data path.

Applesoft Data Formats

Applesoft deals with data in three internal formats: floating point, integer, and character. Floating point values are stored internally as five bytes of data, with the leftmost byte being the exponent and the remaining bytes the mantissa. Integer data is stored as two bytes, with the most significant byte first (just the opposite of address or pointer values). Character data is stored one character per byte in memory. A character string may be of length 0 (null) or up to 255 characters. Page 137 of the *Applesoft Reference Manual* presents the actual data layouts, but a much better description (and more accurate it turns out) can be found on Pages 21-23 of *Call —A.P.P.L.E. In Depth #1:* All About Applesoft.

For floating point and integer values, data in the internal format is directly usable by Applesoft. That is, it does not have to be converted from characters to be used. This conversion is most evident in a simple assignment statement "X=1037.2245." The value "1037.2245" is stored in the Applesoft program as a string of characters taking nine positions. A number in the character format must be converted to the internal floating point format before it can be used in numeric operations. Numbers should be kept in the internal format stored in a variable. The reason is indicated on page 120 of the Applesoft manual: faster execution.

Data to be stored on a DOS text file must be converted to the external character format (also with high bit set) before being placed in the buffer. When this data is brought back into an Applesoft program, the reverse process must occur. The conversions are very time consuming. This is why PFM and many data base systems store the data directly in the binary formats as used by Applesoft.

Floating point and integer values are stored in the symbol table entries of the variables that retain the values. Character values are stored in the dynamic string storage area of memory with a pointer to the string kept in the symbol table entry. We will now look at a program to move data from a buffer into the Applesoft symbol table entries or string storage area so the data can be used by Applesoft.

DOWN THE DATA PATH

Super PEEK and POKE

From the Applesoft language, we have functions PEEK and POKE which already do what we are after. That is, POKE will take the value of a variable (or expression) and store it into a single byte in memory (an internal one byte number). PEEK will fetch a one byte number from a location in memory and return a floating point value to be used by an Applesoft program.

Great, but somewhat slow for handling other than a few integer, floating point, or character values. In fact, it takes almost a minute to move 8192 characters of data (a High-Res page) using a PEEK/POKE loop. This is only improved to approximately half the time by using &PEEK and &POKE to move two bytes per access (February issue, page 27). If we are to move floating point values (five bytes) and character strings with any efficiency at all, then BASIC statements simply will not do.

Let's review the format of a check entry stored by PFM in PFM.DATAFILE:

bytes 0–4	floating point dollar amount
bytes 5–6	integer check number
byte 7	integer month (one byte)
byte 8	integer day (one byte)
bytes 9–10	budget account (character)
bytes 11–24	check notation (character)

```
*985A.9CFF

985A- A2 00 86 19 A0 00
9860- BD 8F 98 F0 1A C9 FF F0
9868- 08 D1 B8 D0 07 C8 E8 D0
9870- EF 4C C9 DE E8 BD 8F 98
9878- D0 FA E8 E6 19 D0 DF 20
9880- 98 D9 06 19 A6 19 BD AC
9888- 98 48 BD AB 98 48 60 4F
9890- 50 45 4E 00 43 4C 4F 53
9898- 45 00 87 00 57 52 49 54
98A0- 45 00 BE C5 00 50 55 54
98A8- C1 00 FF B6 98 44 99 B9
98B0- 99 FE 99 30 9B F9 9B 20
98B8- BB DE 20 73 9A A2 00 20
98C0- 61 9A 86 06 A2 01 20 61
98C8- 9A 86 07 AE 6A AA 20 61
98D0- 9A 8A F0 07 C9 08 B0 68
98D8- 8E 6A AA AE 68 AA 20 61
98E0- 9A 8A F0 07 C9 03 B0 58
98E8- 8E 68 AA AE 66 AA 20 61
98F0- 9A 8E 66 AA A2 00 20 61
98F8- 9A 86 09 20 B8 DE 20 2A
9900- 9A B0 03 4C 4D 9A 20 49
9908- 9A 20 1A A7 A0 02 A9 00
9910- 91 FD C8 A9 01 91 FD A0
9918- 07 A5 06 91 FD A6 07 F0
9920- 09 A6 09 F0 05 A9 08 20
9928- A2 9A A9 01 A6 07 20 A2
9930- 9A 20 E0 9E A5 06 20 C4
9938- A7 20 51 A8 20 97 9A 60
9940- A0 02 4C B4 9A 20 BB DE
9948- 20 73 9A A2 00 20 61 9A
9950- 86 09 20 B8 DE 20 2A 9A
9958- 90 05 20 49 9A D0 03 20
9960- 57 9A A0 03 A9 00 91 FD
9968- 88 D0 FB A9 02 20 A2 9A
9970- A6 09 F0 3D A0 0C B1 FD
9978- 85 50 C8 B1 FD 85 51 A0
9980- 26 B1 50 4A 4A 4A 4A 48
9988- C8 B1 50 48 C8 B1 50 49
9990- FF A0 04 91 FD C8 68 91
9998- FD C8 68 91 FD E0 01 D0
99A0- 07 A9 05 20 A2 9A 90 09
99A8- E0 02 D0 05 A9 07 20 A2
99B0- 9A A0 00 98 91 40 20 97
99B8- 9A 60 20 D6 9A 20 2A 9A
99C0- 90 03 4C 4D 9A 20 57 9A
99C8- 20 BD 9A C8 91 FD C8 A9
99D0- 01 91 FD A6 FB A5 FC D0
99D8- 08 A0 10 B1 FD AA C8 B1
99E0- FD A0 09 91 FD 48 88 8A
99E8- 91 FD A8 68 20 F3 9A A6
99F0- 06 A4 07 20 2B EB A9 03
99F8- 20 A2 9A 20 97 9A 60 20
9A00- D6 9A 20 2A 9A B0 46 20
9A08- 57 9A 20 BD 9A C8 A9 FF
9A10- 91 FD C8 A9 00 91 FD C8
9A18- A5 FB 91 FD C8 A5 FC 91
9A20- FD A9 04 20 A2 9A 20 97
9A28- 9A 60 20 DC 03 84 FD 85
9A30- FE 20 95 A0 20 8C 9A A4
9A38- 19 88 30 09 B1 1A 09 80
9A40- 99 75 AA D0 F4 20 64 A7
9A48- 60 A5 45 D0 04 A0 0C D0
9A50- 63 85 41 A5 44 85 40 20
9A58- 43 A7 20 4E A7 20 2C A7
9A60- 60 20 B7 00 C9 29 F0 0A
9A68- 20 BE DE C9 2C F0 03 20
9A70- F8 E6 60 20 E3 DF 20 6C
9A78- DD A0 02 B1 83 99 19 00
9A80- 88 10 F8 C9 1F 90 04 A9
9A88- 1E 85 19 60 A0 13 B1 FD
9A90- 99 69 BA 88 10 F8 60 A0
9A98- 13 B9 69 BA 91 FD 88 10
9AA0- F8 60 A0 00 91 FD CF D5
9AA8- E0 C3 C1 CE E0 C4 CF E0
9AB0- C2 D9 E0 C8 C1 CE C4 EC
9AB8- E0 C5 D3 D0 C5 C3 C9 C1
9AC0- CC CC D9 E0 C6 CF D2 E0
9AC8- C1 E0 C6 C9 CC C5 E0 D7
9AD0- C9 D4 C8 E0 C1 E0 CC C1
9AD8- D2 C7 C5 E0 CE D5 CD C2
9AE0- C5 D2 E0 CF C6 E0 C5 CE
9AE8- D4 D2 C9 C5 D3 EE E0 0E
9AF0- CF D7 EC E0 CF CE E0 D4
9AF8- CF E0 10 06 0D EE 04 01
9B00- 14 01 06 09 0C 05 E0 15
9B08- D4 C9 CC C9 D4 D9 EC E0
9B10- D7 C8 C9 C3 C8 E0 D7 C9
9B18- CC CC E0 C4 CF E0 C1 E0
9B20- CC CF D4 E0 CF C6 E0 D3
9B28- C5 D1 D5 C5 CE D4 C9 C1
9B30- CC E0 D0 D2 CF C3 C5 D3
9B38- D3 C9 CE C7 E0 CF CE E0
9B40- C1 E0 C4 C9 D2 C5 C3 D4
9B48- E0 C1 C3 C3 C5 D3 D3 E0
9B50- C6 C9 CC C5 E0 C1 CE C4
9B58- E0 CA D5 D3 D4 E0 C1 E0
9B60- CC C9 D4 D4 CC C5 E0 C2
9B68- C9 D4 E0 CF C6 E0 C4 C9
9B70- D2 C5 C3 D4 E0 C1 C3 C3
9B78- C5 D3 D3 E0 D0 D2 CF C3
9B80- C5 D3 D3 C9 CE C7 EE 8D
9B88- 60 03 0D 00 00 00 00 00
9B90- 00 00 00 00 00 00 00 00
9B98- 00 00 00 00 00 00 00 00
9BA0- 00 00 00 00 00 00 24 D0
9BA8- 2D A4 FA 88 C0 FF F0 08
9BB0- B1 FB 29 7F C9 20 F0 F3
9BB8- C8 98 A0 00 91 A0 20 9A
9BC0- DA A5 85 A4 86 85 A0 84
9BC8- A1 4C D6 9B A6 1C F0 06
9BD0- 20 36 ED 20 CF E3 A9 9B
9BD8- 48 A9 E4 48 A5 1D 48 A5
9BE0- 1C 48 4C 5B DA 20 E2 9C
9BE8- F0 08 90 03 4C 37 9B 4C
9BF0- 34 9B A4 FB A5 FC 20 F3
9BF8- 9A 60 20 12 9B 20 9E 9C
9C00- 20 7B DD A5 09 20 0A A5
9C08- FB A4 FC 20 F9 EA 4C CC
9C10- 9B C9 42 D0 05 A2 00 4C
9C18- 7A 9B C9 41 D0 08 A0 01
9C20- B1 FB 88 4C 79 9B B1 FB
9C28- C8 AA B1 FB A8 8A 20 F2
9C30- E2 A5 09 C9 41 D0 45 20
9C38- 01 9B 4C CC 9B A2 02 B4
9C40- FA 94 9D CA 10 F9 20 2A
9C48- E4 A6 1C 30 06 20 07 E7
9C50- 4C D6 9B A5 09 C9 CF D5
9C58- E0 C3 C1 CE E0 C4 CF E0
9C60- C2 D9 E0 C8 C1 CE C4 EC
9C68- E0 C5 D3 D0 C5 C3 C9 C1
9C70- CC CC D9 E0 C6 CF D2 E0
9C78- C1 E0 C6 C9 CC C5 E0 D7
9C80- C9 D4 C8 E0 C1 E0 CC C1
9C88- D2 C7 C5 E0 CE D5 CD C2
9C90- C5 D2 E0 CF C6 E0 C5 CE
9C98- D4 D2 C9 C5 D3 EE E0 0E
9CA0- CF D7 EC E0 CF CE 15 0F
9CA8- 15 0F 00 A0 00 01 69 7A
9CB0- 00 00 00 7A 00 04 00 00
9CB8- 01 04 00 AA 00 01 00 AA
9CC0- 04 00 00 06 00 00 00 00
9CC8- 00 00 00 84 60 01 FF 11
9CD0- 00 00 00 E0 CF C6 E0 D3
9CD8- C5 D1 D5 C5 CE D4 C9 C1
9CE0- CC E0 D0 D2 CF C3 C5 D3
9CE8- D3 C9 CE C7 E0 CF CE E0
9CF0- C1 E0 C4 C9 D2 C5 C3 D4
9CF8- E0 C1 C3 C3 C5 D3 D3 E0
```

Note: The Big Mac source code for FILEIO is available to members on Anthology diskette 10-B and may also be downloaded from The SOURCE.

Our routine must move the check data from a DOS buffer (or some area in memory) to the Applesoft symbol table entry for a variable. When creating a check entry, the routine must move the data from Applesoft (variable or expression) to the buffer.

This is where ampersand routines &GET and &PUT come in. &GET/PUT can be considered a super PEEK/POKE. From the check entry format of PFM, we need to move a floating point number, a two byte integer, and two one byte integers, as well as character data. &GET/PUT provides the functions of regular PEEK and POKE as well as the functions of &PEEK and &POKE. In addition, it will handle character strings and Applesoft integer values. The command format is:

&GET AT location;format (variable list)[;...]
&PUT TO location;format (expression list)[;...]

where &GET AT is used to fetch data from a memory location, and &PUT TO is used to store data into a memory location.

LOCATION is a variable giving the memory address where the operation is to begin. When the operation is finished, LOCATION is updated to the next memory address following the area which was just accessed.

FORMAT indicates the type of data at the memory address specified by LOCATION. The acceptable values are:

- **B** - byte, or one byte integer data value (PEEK/POKE)
- **A** - address, or LO/HI 6502 pointer value (&PEEK/&POKE)
- **I** - Applesoft integer in HI/LO format
- **%** - same as I
- **R** - Applesoft floating point (5 bytes)
- **Cn** - character data, n = length (1-255)
- **$n** - same as C, except that trailing blanks are truncated (see special note later)

FORMAT indicates how many bytes of data to access at the memory address specified by LOCATION, and how the data is to be accessed (for example, % indicates access two bytes of data, and access it as Applesoft HI/LO integer value).

VARIABLE LIST is a list of variables, separated by commas, into which &GET will place the values fetched from the memory address indicated by LOCATION.

EXPRESSION LIST is a list of expressions, separated by commas, that are evaluated, and the values stored into the memory address indicated by LOCATION under the format indicated by FORMAT.

The following program lines are examples of &GET and &PUT that will access a PFM check entry in a data sector buffer and update the information:

```
120 & GET AT LOC;R(SPENT);%
    (NU MBER);B(MTH,DAY);$2(ID$)
    ;$14 (TAG$)
150 & PUT TO LOC;R(SPENT);%
    (NUMB ER);B(MTH,DAY);C2(ID$)
    ;C14(TAG$)
```

where the value of LOC is set by &READ when the data sector buffer in brought into memory. Now for some of those nitty gritty details.

As you can see, the format and list specification (variable list for &GET or expression list for &PUT) can be repeated. Thus, with a single command, we can input all of the data in a PFM check entry. The memory address is automatically advanced from one data field to the next as each field is processed. In line 120, after SPENT is fetched and stored, LOC is incremented by five bytes (the length of a floating point data item), and the next two bytes are accessed for NUMBER. The updated value of LOC is returned pointing at the next byte in memory to be accessed. LOC must be reset before &PUT updates the entry. The above example will appear again in part 4 of D Is For Data.

```
]LIST

10  REM

 BUILD VTOC.DIRECTORY FILE
     BY KEN KASHMAREK

CALL -A.P.P.L.E. : NOV. 1983

20 F$ = "VTOC.DIRECTORY"
25  & OPEN(F$,8,0): REM OPEN TYPE
     "S" FILE
30 VT = 17: REM VTOC TRACK=17 ($1
    1)
35 FM = 46523: REM $B5BB IN 48K DOS
40 LOC = FM + 12: &  GET  AT LOC;
    A(FW): REM GET ADDRESS OF FI
    LE MANAGER WORK AREA
45  &  GET  AT LOC;A(TS): REM GET
     ADDRESS OF TRACK SECTOR LIS
    T
50  REM BUILD T/S ENTRY FOR VTOC
52 LOC = TS + 12: & PUT TO LOC;B(
    VT,0)
55  REM BUILD T/S LIST FOR DIREC-
    TORIES
60  FOR I = 1 TO 15
65  & PUT TO LOC;B(VT,16 - I)
70  NEXT
85 LOC = FW + 4: & PUT TO LOC;B(1
    28): REM FLAG TO REWRITE T/S
     LIST
90  & CLOSE(F$,2): REM CLOSE AND LOCK
95  END
```

```
]LIST

10  REM

  INPUT VTOC.DIRECTORY FILE
      BY KEN KASHMAREK

CALL -A.P.P.L.E. : NOV. 1983

25 F$ = "VTOC.DIRECTORY"
30 X = 115: &  GET  AT X;A(OH): REM
    SAVE OLD HIMEM VALUE
35 HI =  INT (OH / 256) * 0256 -
    4096: REM COMPUTE NEW HIMEM

40  HIMEM: HI: REM SET NEW HIMEM
45  & OPEN(F$,8,1): REM OPEN TYPE
     "S" FILE
50 BU = HI: REM SET BUFFER
55  REM READ IN VTOC SECTOR AND
     THE DIRECTORY SECTORS
60 HS = 1: REM SET HIGH SECTOR #
65  FOR SE = 0 TO 15
70  &  READ (F$,SE,BU): REM READ
     EACH SECTOR INTO MEMORY
75  IF SE = 0 THEN 95
80 LOC = BU + 11: REM GET TRACK

85  &  GET  AT LOC;B(T)
90  IF T = 0 THEN HS = SE:SE = 15

95 BU = BU + 256: REM NEXT PAGE
100  NEXT SE: & CLOSE(F$)
```

DOWN THE DATA PATH

For each format, a length is implied. However, for character strings, the default length of one byte can be overridden by specifying the length after the format character. Thus, C2 indicates the the data in memory occupies two bytes. The length value, indicated as decimal digits following the "C" or "$" format indicator, can be from 1 to 255 bytes. If "C" is used for character data, the resultant character string is set to the length specified after the format character. That is:

```
100 &GET AT LOC;C37(A$)
110 PRINT LEN(A$)
```

prints out a value of 37 for the length of A$. For "C," the string descriptor pointer points to the character string at its original location in memory (i.e., in this example, the address specified by LOC). The string is not moved to the Applesoft string storage area. This helps to keep down the garbage collection problems. This is useful for character string values that have a short life span. If the value must be retained, the the "$" character format can be used to move the data to the Applesoft string area. The "$" format also truncates trailing blanks. Due to an anomaly in the Applesoft string assignment routine, if the memory address specified by LOC is below the current bottom of string pointer (STREND, $6F/$70), then the string is not moved to the string storage area. This even applies to the "$" format. In this case, Applesoft thinks the string is part of the BASIC program, and only changes the string pointer in the descriptor.

&GET and &PUT also perform conversion from integer to floating point and to/from character strings. Thus:

```
100 &GET AT LOC;R(A$);C3(I%)
110 &PUT TO LOC;$8(X,Y,C$);('333')
```

are valid operations. Internally, STR$ and VAL functions are used for the data type conversions. Remember, format provides the length and attribute of the data at the memory address indicated by LOC. For &GET, the variable type indicates how the data is to be passed back for use by Applesoft. For &PUT, the expression type provides the attribute of the data which may have to be converted to the data type indicated by format.

The &GET/PUT Demo program moves data from Applesoft to a memory location, and retrieves that same data. The assembly language routines are actually a part of the program presented in part 2 of D Is For Data. Last time, we indicated that part of the space reserved by FILEIO LOADER would be filled in by &GET/PUT. A minor correction also had to be added, so the origin of FILEIO also moved. The assembly language listing provides the new origin, the insertions to the command table and address table, as well as the code to be added to the end of FILEIO. Don't forget to change the origin in FILEIO LOADER as well. Once assembled, everything is again set up with BRUN FILEIO LOADER.

Earlier, we mentioned that data stored in binary formats would take less space on the disk and could be processed faster. To demonstrate this, a DOS formatted text file was created containing 5000 random numbers. The elapsed time to create this file was 235 seconds and the file took 217 sectors. Then the same data was written to a file in binary formats. This file took only 90 seconds to create and the disk space required was only 100 sectors. This is a worst case situation, but it illustrates the speed and space advantage using binary format for storing data. Now, let's use a program with &GET/PUT that everyone can run.

Build and Input VTOC.DIRECTORY

Not everyone has a PFM.DATAFILE to process. However, everyone does have a catalog to process. Let's make use of what we have learned so far to process the VTOC and directory of a diskette. But first, a *warning:* do not run these programs against a diskette that you cannot afford to lose. Even a simple keying error could spell disaster for your data. Proceed with caution!

The first program, BUILD VTOC.DIRECTORY, will create a type "S" file on a diskette. This file, named VTOC.DIRECTORY will have one sector allocated for the track/sector list. The BASIC program then uses &PUT to modify the T/S list in the DOS buffer to point at the VTOC and DIRECTORY of the diskette. When this is done, the file manager is updated to write the T/S list back, and the file is closed and locked. Do not delete this file! If you do, the VTOC and directory sectors will be marked as free (another good reason to use a diskette that you do not depend on).

```
105 VT = HI + 6: &  GET  AT VT;B(
    V): TEXT : HOME
110  PRINT : PRINT "DISK VOLUME "
    ;V: PRINT
115 DI = HI + 256: REM DIRECTORY
    SECTOR
120 US = 0: REM USED COUNT
125  FOR I = 1 TO HS
130 DI = DI + 11: REM DIR. OFFSET

135  FOR J = 0 TO 6
140  &  GET  AT DI;B(T,S,FT);$30(
    N$);A(L)
145  IF T = 0 OR T = 255 THEN 200

150 L$ = " ": IF FT > 127 THEN L$
     = "*":FT = FT - 128
155 T$ = "T"
160  IF FT = 1 THEN T$ = "I"
165  IF FT = 2 THEN T$ = "A"
170  IF FT = 4 THEN T$ = "B"
175  IF FT = 8 THEN T$ = "S"
180  IF FT = 16 THEN T$ = "R"
185 LL$ =  RIGHT$ ( STR$ (L + 100
    0),3)
190 US = US + L
195  PRINT L$;T$;" ";LL$;" ";N$: IF
     PEEK (37) > 20 THEN  PRINT
    : PRINT "HIT ANY KEY TO PROC
    EED";: GET A$:A =  ASC (A$):
     ON A = 3 OR A = 27 GOTO 215
    : HOME
200  NEXT J: NEXT I
205 FR = 560 - US - 64: REM ASSUMES DOS
210  PRINT : PRINT FR;" FREE SECTORS"
215  HIMEM: OH
220  END
```

After this program has been run (it must be preceded by BRUN FILEIO LOADER), then we can run INPUT VTOC.DIRECTORY which will read the file and produce the same output as the CATALOG command, plus free sectors on the diskette. Due to our modification of the T/S list of VTOC.DIRECTORY (the "S" file), the data sectors for this file are now the VTOC and directory sectors on track 17 ($11).

I do not recommend this approach for general purpose processing of the vtoc and directory on a diskette. It is used here as an example of using &PUT to store data in memory and &GET to access the catalog entries. However, I do prefer it to some BASIC programs which call an RWTS routine and pass parameters via PEEK/POKE to page zero locations or DOS locations. The routine to build the type "S" file is easily reversed to &OPEN to unlock the file, use &PUT to clear the T/S list entries, and &CLOSE to delete the file (see program listing DELET VTOC.DIRECTORY).

See You Next Month, Same Time, Same Place...

We are on the home stretch now. So far, we have covered PFM.DATAFILE, how to access files, and how to process data in binary formats. Next time, D Is For Data will present a utility to process PFM.DATAFILE from beginning to end.

There are an infinite number of possibilities for the &GET/PUT routines. Additional formats could process ASCII hexadecimal characters to and from internal data bytes. A text format character could be included to process DOS formatted text files. Or even array options to process entire arrays. Enough food for thought. See you next time with PFM.DATAFILE UTILITY.

```
]LIST

10  REM

DELETE VTOC.DIRECTORY FILE
     BY KEN KASHMAREK

CALL -A.P.P.L.E. NOV. 1983

20 F$ = "VTOC.DIRECTORY"
25  & OPEN(F$,8,1,,,,1): REM OPEN
     AND UNLOCK
30 VT = 17: REM VTOC TRACK=17 ($1
    1)
35 FM = 46523: REM $B5BB IN 48K D
    OS
40 LOC = FM + 12: &  GET  AT LOC;
    A(FW): REM GET ADDRESS OF FI
    LE MANAGER WORK AREA
45  &  GET  AT LOC;A(TS): REM GET
     ADDRESS OF TRACK SECTOR LIS
    T
50  REM CLEAR T/S ENTRY FOR VTOC

52 LOC = TS + 12: & PUT TO LOC;B(
    0,0)
55  REM BUILD T/S LIST FOR DIREC-
    TORIES
60  FOR I = 1 TO 15
65  & PUT TO LOC;B(0,0)
70  NEXT
85 LOC = FW + 4: & PUT TO LOC;B(1
    28): REM FLAG TO REWRITE T/S
     LIST
90  & CLOSE(F$,1): REM CLOSE & DE
    LETE
95  END
```

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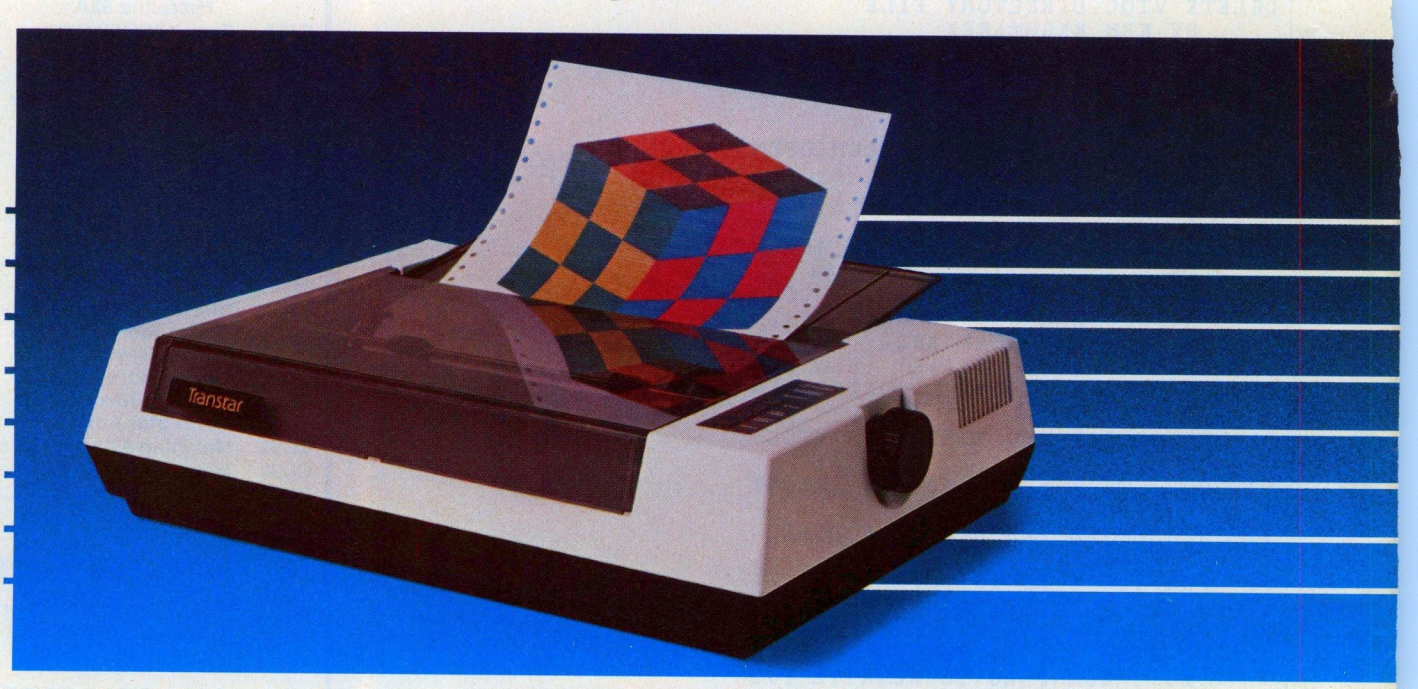

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COMPUTER FUTURES:

Exotic Technologies

Jonathan V. Post/contributing editor

WELCOME to the third part of a three-part article — *Computer* Futures. These articles, which are excerpted from a book-in-progress, will lead to further articles — and you will help to choose the contents. Before we get to this interactive feature, let's briefly survey what has been covered in the first two articles.

We've seen how the facts of computer technology are stranger than science fiction. We've seen the human race evolve from silicon, to iron, to carbon, to plutonium, and then back to the age of silicon again, through the New Renaissance of the computer chip.

. . . the facts of computer technology are stranger than science fiction.

We've seen how AI (Artificial Intelligence) has left the campus for the boardroom, the battleground, and the genetic engineering laboratory. We've seen AI evolve from the dreams of Charles Babbidge & Ada Augusta Lovelace to the chessboards of grand masters.

We've seen how Robotics evolved from theater and science fiction to the factories and spaceships of today.

We've looked behind the screen of computer graphics to the supercomputers that make super-high-resolution movies. We've seen the CRT become a "Dream Machine" (to use Theodor Nelson's term) — an artistic window into a computer-generated universe.

. . . about the author

Jonathan V. Post considers the "Age of Silicon" to be a new renaissance, and has become a new renaissance man. His 230 publications and presentations span a spectrum from science to art.

His double Bachelor of Science from Caltech (1973) is in Mathematics (advanced logic) and English Literature (poetry). His scientific programming experience (since 1967), Artificial Intelligence and Robotics work with JPL's Mars Rover, and his experiments in psycholinguistics led him to graduate work at the University of Massachusetts at Amherst. Jonathan's Master of Science (1975) includes a thesis on parallel automatic theorem proving. His all-but-degree Ph.D. research in Molecular Cybernetics — the dynamics of enzyme systems, the theory of protein computers, and the evolution of algorithms.

Jonathan V. Post has worked with Theodore Nelson's Xanadn™ and Hypertext™ projects — he is listed in *Leading Consultants in Computer Software.* In four years at Boeing Aerospace Company in Seattle, he applied his expertise to space and missile projects with the Army, Navy, Air Force, and NASA. Now on loan from Boeing Services International to Jet Propulsion Laboratories, he is designing software to aim the cameras on GALILEO — an unmanned spacecraft due for launch in May 1986. In September 1988, GALILEO will orbit Jupiter and parachute a probe into the planet's atmosphere.

For further biographical material, consult *Who's Who in International Poetry* and *Jane's Who's Who in Aviation and Aerospace.* Jonathan's interactive book *Computer Futures* will be published by Jim Baen Inc. in 1984.

We've welcomed personal computers into our homes, tamed them, bred them to be user-friendly, and predicted they would become so "convivial" that they would follow our lives from before we were born until after we might pass away. The November 1982 *Call -A.P.P.L.E.* presented my poem "The Ghost in the Machine" — a humorous but cautionary tale of a personal computer programmer's obsession which reached beyond the grave.

Fantasy aside, we've sampled a few of the "exotic technologies" which will take us into the 21st century with devices to handle a quintillion bits — a mega-mega-megabit. Perhaps the computer of the future is a biomolecular device, able to use the atoms of life to compute in a test tube — or as a repair-device in our bloodstream to bring us a kind of computer-assisted immortality.

EXOTIC TECHNOLOGIES

5. Exotic Technologies: Behind the Locked Lab Door

The future of the computer may be locked behind the doors of physics laboratories. Cryogenic computers that find 100 degree below zero liquid air to be uncomfortably hot, molecular computers made of human proteins crossed with metal circuitry, hologram memories probed by laser beams, these are all curiosities for white-robed scientists today. Some of them may dominate new industries tomorrow.

The white-robed scientist holds the test-tube in her hand. She raises it towards the sky-light, as if proposing to toast with a glass of vintage wine. "Eureka!" she cries, as scientists since Archimedes have exulted, "My new computer has reproduced!"

The technology of the molecular computer is being developed today.

Computer in a test-tube? Computers that reproduce? What strange technology is this? How does it work, where is it going, and what does it mean? The technology of the molecular computer is being developed today. It is a child of the genetic engineering revolution. This technology blurs the dividing line between living organisms and non-living computers. If you, the reader, are human or machine, your future is affected. Let's look inside the test-tube as we would look into a crystal ball.

What is a molecular computer? A molecular computer is an artificially designed ultramicroscopic machine which moves atoms and electrons in a logical pattern. The machine is built of proteins, nucleic acids, metals and non-metals in a planned arrangement. It can process information, respond to input signals, and produce meaningful output. The molecular computer may be used as a tool to manipulate other ultramicroscopic materials, such as living cells, crystals, or artificial DNA. The molecular computer may reside inside an organism to monitor or control biological processes. It may be used to manufacture bizarre molecules, or to construct electronic micropatterns far smaller than is possible with optical or E-beam lithography. A molecular computer may even be used to build another molecular computer — thereby reproducing itself!

The race is on to build the first molecular computer. The United States, Japan, and the Soviet Union have laboratories of biotechnologists converging on this goal. Much of the research is classified, and sponsored by military agencies. Some research is proprietary, kept secret by corporations who hope to beat their competitors to juicy profits. A fraction of the molecular computer story is scattered through the pages of obscure academic journals. Some of what we report here is word-of-mouth from scientists who cannot, legally, disclose full details.

. . . artificial proteins are being used to fabricate some of the world's smallest microcircuits.

In the gleaming laboratories of EMV Associates in Rockville, Maryland, two men are demonstrating the feasibility of the future. James McAlear and John Wehrung are using artificial proteins to fabricate some of the world's smallest microcircuits. The amino acid Lysine, found in all living tissues, is teased into long molecular chains called polylysine. The polylysine is coated on a super-clean square of glass, and a pattern of micro-thin lines is washed away. A second kind of artificial protein is made by sticking silver atoms on molecules of enzyme. The metallized enzymes cling to the polylysine. When the amino acids are washed away, fine lines of silver remain on the glass. The silver lines, a quarter of a micron wide [replace with "seventy-thousand times thinner than spider-web" or whatever] could be the electrical circuitry of a tiny computer — ten times smaller than can be made today. McAlear and Wehrung recently won two U.S. patents for this: "Micropattern substrates and the method for making micropatterns."

One problem with this work is the difficulty of predicting the behavior of artificial proteins. Linking together the amino acid building blocks of protein is the easy part. Understanding how the chain of amino acids fold, twist, cross-link, and crumple into three-dimensional form is more mysterious. McAlear is optimistic. "To bring this biochemical research to the development stage, it will take the capabilities of advanced computer systems to model and predict the properties of the amino acid sequences which comprise the characteristics of protein."

Where does this work go from here? The National Science Foundation (NSF) is funding McAlear and Wehrung for their research, which they call VHD [Very High Density]. McAlear predicts the fabrication of devices which are three-dimensional (as opposed to coated on a glassy surface), which are 10 nanometers across [a zillion times smaller than a spider's eye, or whatever], and where every single atom is in a preplanned position. At the 31st Annual Electronic Components Conference in Atlanta, McAlear suggested that "This could lead to an evolution of electronic devices in a manner analogous to living things, except that logic may direct such an evolution instead of natural selection."

The scientist with the clearest overall vision of molecular computer technology is K. Eric Drexler, a Research Affiliate at MIT. Eric Drexler is a man of many talents, widely known as a Director of the L5 Society, and as the inventor of a sophisticated solar sail. His paper "Molecular Engineering: An approach to the development of general capabilities for molecular manipulation" appears in the September [according to galleys] 1981 Proceedings of the National Academy of Science, USA, and is already attracting unusual attention to the shape of things to come.

6. The Far Out Future

This final topic in our exploration is the most speculative, and cannot be presented in its entirety in this article. As Arthur C. Clarke has said "any sufficiently advanced technology is indistinguishable from magic." The further we look into the future, the more magical it becomes, and the harder to translate into the language of the present.

. . . computers are our springboard to the stars. . .

I believe that computers are our springboard to the stars, and that data is destiny. In some of my addresses to A.P.P.L.E., I have outlined the far future, and these talks will soon be made available as color videotapes. Now, let us look no farther into the future than the year 1999, when technology is still distinguishable from magic but has begun to transform our world beyond our current understanding.

By the year 1999 there will be roughly one billion computers in the world. This will change everything. The vast majority will be owned as info-consumer products belonging to individuals at home, at work, or in trans-urban environments.

Five of the world's six billion people will not have access to the global multinet, and this will define the boundary between the haves and the have nots, the hungry poor and the fin-de-millenium rich.

Much of the world's wealth will be software — representations of knowledge, material, distribution, and processing systems. Most primary and secondary laborers (those who collect, extract, grow, move, or process goods) will be economically subservient to tertiary and quaternary professionals (services, facilities, education, management, government, military). Alternatives — such as world-wide revolution — seem unlikely. Computers concentrate power. In democratic lands, the power of the individual will be concentrated in the individual (i.e. decentralized). Under totalitarian governments, the power of oppression will be horribly amplified by the computer. The truly personal computer will be the greatest threat to these database dictatorships.

. . . the power of oppression will be horribly amplified by the computer.

The deep-space network will, tenuously, occupy a volume roughly one trillion times the volume of a sphere containing the entire solar system. Artificially intelligent one-way robot spacecraft will be in laser contact with us while cruising at one-tenth the speed of light through a handfull of neighboring star-systems.

Nickel/Iron economics will lead to the beginnings of exploitation of asteroidal resources. Yet fewer than a thousand people will have been born off-planet. The trillion-meter wide sphere of "colonized" void around the Earth/Moon center will draw and pull upon the mass consciousness in a way qualitatively different from any frontier in history.

The inner sphere will dominate conscious attention, as high data density provokes a technologically enhanced personal and cultural introspection. The TV generation of passive extroverts will be replaced by the cybergeneration of active introverts.

The senses were most rapidly extended by electromagnetic spectrum technologies. The mind will most rapidly implode under the pressure of cybernetic information technology.

Symbolic communication will be tentatively established, through computer gestalt-translators, with ten to a hundred species, mostly ceteced and anthropoids.

What hackers and videogame addicts experience is something beyond mere computing.

A class of program-enhancing pharmaceuticals will begin to replace ethanol, caffeine, and nicotine. A new state of consciousness, involving chemically amplified immersion in simulated microworlds, will challenge metaphysical assumptions. What hackers and videogame addicts experience is something beyond mere computing.

Art will begin to unify under a common computer communication medium, and yet be fragmented by intercultural cross-talk and radical esthetic permutation.

The universe may well be filled with intelligent species who process enormously greater databases. If not, we will become those species some day — far beyond 1999. The evolution of the cosmos has led to increasing quantities of living matter, ever more mentality. Data will dominate the destiny of worlds. And we will be part of that cosmos.

7. Menu

Any of the following 50 topics can be explored in *Call -A.P.P.L.E.* and in the interactive book *Computer Futures* — if *you* are interested enough to demand the data in depth!

1) Supercomputers (has Japan seized the torch?)
2) Software Engineering (can software development really be managed by non-computer-literate administrators?)
3) Computer Languages (how many home computer users ever hear of CMS-2 or SPL-1 from the Navy, Jovial J73 from USAF, or the Army's TACPOL? Yet these engender bucks.
4) Computers & War — A robot finger on the button.
5) Computers & Space — Be an astronaut without leaving home.
6) Computers & Literature — Xanadu and hyper-literacy-beyond books.
7) Computer Networks and Distributed Computing Systems.
8) The Science-Fiction Connection.
9) The Age of Silicon — and Beyond Gallium Arsenide.

—●→

10) Before Babbage — The Prehistory of Computers.
11) Ada — A woman gives birth to programming.
12) Peter Szolovits — Inside MIT's AI Lab.
13) Oliver Selfridge & Sons — The Machine Perception Dynasty.
14) Edward Riseman — Computer Vision for fun & profit.
15) Rand Waltzman — The Expert Systems expert.
16) Language Translation — A mechanical accent.
17) Computer Genetics — Chromosome computing.
18) Robotics — The future of automation.
19) Robot languages — Talking to your arm.
20) Theodor Nelson — The visionary father of Computer Lib.
21) John Whitney — The first computer movie man.
22) John Whitney, Jr. & Gary Demos — Supercomputer graphics.
23) Tom DeFanti — Rebel in the graphics establishment.
24) Convivial Computers — Hanging out with the machines.
25) What was I doing with personal computers before Apple?
26) Why the first personal computers died?
27) Up In Smoke — Hacker's nightmares come true.
28) If you're so smart, why ain't you rich?
29) Keyboard Kwestions — Typewriters versus pianos.
30) Videogame aesthetics — The serious side & fun.
31) Computer sex — Out of the closet at last.
32) More about Molecular Computers.
33) Quiterons Won't Quit — Exotic computer devices.
34) Superconductors — Deep Freeze programming.
35) Computers and the human brain — A battle of nerves.
36) Networking Planet Earth.
37) Computers and Magic — Will technology be comprehensible?
38) Computer Haves and Have-nots — Geopolitical implications.
39) Software as wealth — Gigabytes are better than Gold.
40) Computers versus totalitarianism — Personal computer politics.
41) Active Introverts — The psychology of hacking.
42) Computer Communication with other living species.
43) Computers and Drugs — Pills for programmers?
44) Computers and Extraterrestrials.
45) Debugging Society.
46) Computer Optimism vs. pessimism.
47) Name your own topic.
48) The Farout Future — Computers & Human Destiny.
49) Bibliography — Where can I find more information?
50) Glossary — A Data-age Dictionary.

For instance, here's a piece for Distributed Computers: an example of what you might see in future issues of *Call -A.P.P.L.E.* if you had written a letter to the editor, or left a message on the electronic bulletin board A.P.P.L.E. Crate. Suppose you had asked for item 7 on the sample menu above. Your output, in a later excerpt from the interactive book-in-progress *Computer Futures* might read out something like this:

The First Distributed Computer

The first distributed computer was built by John Mauchley and Presper Eckert. This was the BINAC, designed circa 1947 to be the first stellar navigation guidance system for intercontinental ballistic missiles. BINAC, which was also the first computer to use magnetic tape, was little known to the computer community, due to security considerations. In modern terminology, BINAC was clearly a distributed computer. It consisted of two CPUs, each capable of autonomous operation, tightly coupled for the purpose of redundancy, reliability, and testability. Mauchley acknowledges that the structure of the human brain with its two cerebral hemispheres was a guiding metaphor in the design of BINAC.

[Mauchley, John; Personal communication, Philadelphia, PA, June 1978]

Mauchley told me about a demonstration of BINAC that he presented to young Tom Watson, Jr. (later to transform IBM into the super-corporation it is today). Also at the demonstration was General Groves, the man who ran the Manhattan Project. While Groves distracted Mauchley, his lieutenants covertly snipped off a piece of the newfangled magnetic tape for later analysis.

Mauchley's run-ins with the military did not stop there. To his dying day he insisted that he had invented the fundamental idea of the stored-program digital electronic computer, and that John Von Neumann stole the idea, and got credit because Von Neumann had a high enough security clearance to tell people about it at all the important electronic laboratories of World War II. Mauchley himself was accused of theft by the lawyers of Professor Atanasoff. . . who proved to the satisfaction of the court that Atanasoff (still alive at 90) built the Atanasoff-Berry Computer out of $300 of second-hand parts, and showed Mauchley this prototype. Mauchley and Presper Eckert reportedly drew the key circuits on a cocktail napkin at a local bar, had the napkin notarized, and used it as a basis for their own patent.

Mauchley and Eckert tell a far different story — and Mauchley, before he died, revealed a number of astonishing facts to this author.

The Brain is a Distributed Computer

Dr. Roger Sperry, in experiments performed at Caltech, established that the brain is a distributed computer. In Sperry's classic "split brain" experiments, apes and humans both showed this property. Each hemisphere of the brain has most of the capabilities of a entire brain. There are significant differences in the way each hemisphere processes information. Normally, the two hemispheres are tightly coupled by a nerve bundle called the *Corpus Callosum.* When this communications link is cut, by scalpel or by traumatic injury, the two halves of the brain begin to operate autonomously.

Sometimes, this degrades performance. One hemisphere may direct an arm to move some object, and the other hemisphere doesn't know what the object is. Literally, "the left hand knows not what the right hand is doing." The two hemispheres process written and spoken language differently, but each has some linguistic competence. There may be benefit in decoupling the brain hemispheres. For some epileptic patients, the operation of last resort (cutting the corpus callosum) can prevent electrical seizures from spreading across the entire brain. This research is extremely important to research and development in the field of Computer Science. To pioneers in the field — Turing, Weiner, Von Neumann — the computer was a metaphor for the human brain. Better understanding of the brain's distributed functioning may help us to design more effectively functioning distributed computer systems. Dr. Sperry won the Nobel Prize for Medicine in 1981.

[Sperry, Dr. Roger; personal communication, Caltech, 1973]

A colleague of Dr. Sperry at Caltech, Dr. James Old, is famous for his discovery of the brain's pleasure center. Science Fiction by Larry Niven, Spider Robinson, and others has explored the possibilities of super-addict "wireheads" who will do anything to get their pleasure centers jolted by electric signals. In the late 1960's, I heard Dr. Olds remark that it was unethical to experiment with the implantation of electrodes into human pleasure centers. Besides, he added, who would volunteer for such an operation? All around me were long-haired hedonists mumuring "Me first, me first..."

The First Multiple Computer System

The first multiple computer system was created in 1954, when researchers at the National Bureau of Standards interconnected the two computers SEAC and DYSEAC. It was claimed that this dual computer system could efficiently solve problems beyond the capabilities of the two individual computers. This led directly to the first proposal to be published on the construction of a multiple computer system, PILOT.

PILOT, a project which was never completed, consisted of a main computer, a "clerical" computer, and a processor dedicated to I/O. "These computers intercommunicate in a way that permits all three to work together concurrently on a common problem...The system can be...used in conjunction with other digital computer facilities forming an interconnected communication network in which all the machines can work together collaboratively on large-scale problems that are beyond the reach of any single machine."

The BINAC and PILOT projects illustrate that the concerns of distributed computing systems have been with us for over 30 years, but that the problems of design and implementation of distributed computers have been, at times, unmanageable. Modern management methodology precludes two computers from being casually linked together (as with SEAC and DYSEAC), but also lessens the likelihood of major innovations floundering (as with PILOT) and yet the hobbyists and personal computer users of today, in increasingly large percentages, are linking their home and office machines into networks of extraordinary capabilities. Whether we become a "Network Nation" is not just a computer issue — it is a political decision of global significance. Perhaps the "Global Village" of electronic communications media (envisioned by Marshall McLuhan) will combine with the personal computer to become a "Planetary Network," "PlaNet," "World Window," "TerraType," "Geo-I/O," or "Infosphere" — but that's another topic. What we may safely predict is: the computer network and the distributed computer system are here to stay — whatever we call them.

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EXPLORING THE WORLD OF SPREADSHEETS:

What's the DIF?

David G. Sparks/Call —A.P.P.L.E. staff writer

BUSINESS users of microcomputers probably encounter the problem sooner than others: data files of one program can't be read by another. Users of some common spreadsheet programs, including those sold by this club, may wish they could use the sorting or report generating features of a database program. Alternatively, numeric data contained in a database might be usefully manipulated by a spreadsheet.

Visicorp was probably the first company to attempt a solution to this problem. Though each of their products uses its own file structure, most are capable of saving and reading a common file structure called the Data Interchange Format, or DIF™.

The files are written as standard DOS Sequential Text Files of varying record lengths but with clear, tightly defined organization. A programmer can make use of the structure to prepare data for automatic entry into a variety of commercially distributed programs.

DIF™ is a trademark of the file structure's developer, Software Arts, Inc. They are the original creators of VisiCalc. VisiCalc™ and VisiPlot™ are registered trademarks of Visicorp.

The documentation of THE Spreadsheet 2.0, sold by this club, contains a quick description of the DIF™ file structure and some suggestions as to its use. But there is more to both structure and usefulness than given there. Some readers may have programs which can use DIF™ files, but which do not give detailed descriptions.

Two additional, useful sources are listed at the end of this article. Of particular interest is the DIF Technical Specification, which is available by mailing $6.00 to the DIF Clearinghouse at the address shown below.

The accompanying program was written to convert data obtained in string form from Dow Jones News/Retrieval into useable form for VisiPlot™ without having to enter it by hand. While the data could have been transformed directly into VisiPlot™'s regular file structure, it seemed more productive to output the data in DIF™, to make it accessible to other programs as well without further manipulation.

A DIF™ file is essentially a representation of a list or array of data. Arrays are readily pictured as rectangles in which data are arranged in ranks and files, rows and columns, or in the case of DIF™ files, VECTORS and TUPLES. A TUPLE is a list of VECTOR elements which can either represent one row extending across V (for VECTORS) number of columns, or one column stacked V rows high. This ability to be interpreted as either row-column or column-row arrangement gives DIF™ files a major advantage in flexibility. THE Spreadsheet 2.0 and VisiCalc™ actually do make use of DIF™ files to convert data from one arrangement to the other.

DIF™ files have two sections. The first is the Header Section, which is made up of Header Records. Header Records contain information about the structure of the data. A header record consists of three lines, each ending with a carriage return. The first line is an upper-case string of no more than 32 characters, not in quotes, called a "Topic." The second line consists of two numbers separated by a comma. The third line is a string and is always enclosed in quote marks. If there isn't any string, then DIF™ requires two sets of quotes with nothing between them.

Four specific header records are required:

```
TABLE
0,1
"{string}"

VECTORS
0,V
"{string}"

TUPLES
0,T
"{string}"

DATA
0,0
"{string}"
```

The TABLE record is the first in the file. The numeric information consists of a zero, a comma, and the version number, which must be 1. The string information, which must be contained within quotes, would be the name of the table, or the name of the file. This string can be null with no discernable effect on any of the commercial software with which I tested my results.

—◉→

business

WHAT'S THE DIF?

The numeric information given in the VECTOR and TUPLE elements consists of a zero, a comma, and a second value giving the number V of VECTORS and the number T of TUPLES. The string information might be useful in some applications, but I have typically seen it left null.

Other Header Records may appear. VisiPlot™ uses a rich assortment of them to contain information which it needs to know. Each VECTOR is to VisiPlot™ a list of points which could be plotted on a graph. Each such list has a name, a starting date, and a frequency of change. Header Records giving this information for each VECTOR appear in the table which accompanies this article.

Interestingly, though these optional Header Records have significance for VisiPlot™, they pass right through VisiCalc™ or THE Spreadsheet 2.0 without causing a problem. This is more evidence of the flexibility of DIF™ files — there is enough information in the data stream to allow each program to wait for and pick out only what it needs.

The Technical Specification makes one very good point here which VisiPlot™ illustrates well. If the information needed by a program does not appear among the header records, then the program should prompt the user for the missing data and continue to read the balance of the DIF™ file. VisiPlot™ does this. Imagine how upset you would be if the file were rejected instead!

No program should fail to accept a DIF™ file for lack of so-called "optional" header records as long as the four required records listed above are there. Likewise, no program should reject a DIF™ file which does contain such "optional" header records put there by some other program for its own consumption, or for benefit of a third program.

You can see examples of "optional" header records in the accompanying tables.

```
                    ********************************
                    *                              *
                    * FRACTION CONVERT by D Sparks *
                    *                              *
                    * Call -A.P.P.L.E. : Nov. 1983 *
                    *                              *
                    * Convert strings such as      *
                    * "12 1/2" to "12.5"           *
                    *                              *
                    * Delete "JSR CHKCOM" to use   *
                    * with Routine Machine.        *
                    *                              *
                    * Will strip off leading and   *
                    * trailing spaces, so need     *
                    * not be done prior to call.   *
                    *                              *
                    * Simply call with string      *
                    * variable name containing     *
                    * value to be converted.       *
                    * The transformation takes     *
                    * place entirely within the    *
                    * memory already allocated to  *
                    * the passed parameter, so     *
                    * no garbage is caused.        *
                    *                              *
                    * Example from above, where    *
                    * A$ = "12 1/2", A$ will       *
                    * return "12.5". The bytes     *
                    * are written over the old     *
                    * bytes of A$ in memory.       *
                    *                              *
                    ********************************

                    CHKCOM   EQU  $DEBE
                    PTRGET   EQU  $DFE3
                    YTEMP    =    2
                    STROFFST =    8
                    TBLOFFST =    9
                    DECTABLE =    6
                    FRCTABLE =    4
                    STRPTR   EQU  $1A          ;AND $1B
8000: 20 58 FF              JSR  $FF58        ;Known location in Monitor = RTS
8003: BA            TRICK    TSX               ;Move stack pointer to X register
8004: BD 00 01              LDA  $100,X       ;Get low byte of TRICK location
8007: 85 03                 STA  3            ;and save it.
8009: CA                    DEX
800A: BD 00 01              LDA  $100,X       ;Get high byte of TRICK location
800D: 85 02                 STA  2            ;and save it, too.
800F: 18                    CLC
8010: 69 E5                 ADC  #<FRACTIONS-TRICK+1 ;Handy use of BIG MAC math
8012: 85 04                 STA  FRCTABLE     ;capabilities to locate table for
```

business

The final mandatory header record is the DATA element. Its numeric information is always 0,0 and the string is null. It will follow all other header records.

Immediately following the DATA element are the data themselves. (You did know that "data" is the plural of "datum," didn't you. Of course you did.) The data are contained in Data Records. Each data record is two lines long, and each line ends with a carriage return. The first line consists of two numbers, called the "type indicator" and the "number value." They are separated by a comma.

The type indicator will have one of three values:

-1 : the record is a Special Data Value, meaning either a Beginning Of Tuple signal or an End Of Data signal. The number value (the second number) will be zero. The string value (second line) will be either "BOT" or "EOD." These strings do not have to be in quotes. The Technical Specification does not say whether quotes are in fact forbidden in the string part of a Special Data Value. I have never seen quotes here.

0 : the record represents numeric data. The number value contains the actual value. The string contains something called the Value Indicator. This is usually an uppercase "V," but can also be:

NA : Not Available. The number value is zero.

ERROR : the result of an invalid calculation. The number value is zero.

TRUE : Logical True. The number value is 1.

FALSE : Logical False. The number value is 0.

```
8014: A5 03     52          LDA  3           ;later use.  Allows relocatable
8016: 69 00     53          ADC  #)FRACTIONS-TRICK ;program to use lookup tables.
8018: 85 05     54          STA  FRCTABLE+1
801A: 18        55          CLC
801B: A5 02     56          LDA  2           ;Now doing the same thing for the
801D: 69 54     57          ADC  #(DECIMALS-TRICK+1 ;second table.
801F: 85 06     58          STA  DECTABLE
8021: A5 03     59          LDA  3
8023: 69 01     60          ADC  #)DECIMALS-TRICK
8025: 85 07     61          STA  DECTABLE+1
8027: 20 BE DE  62  START   JSR  CHKCOM      ;Remove this line if using Routine Machine
802A: 20 E3 DF  63          JSR  PTRGET      ;Get pointers to string being processed
802D: A0 00     64          LDY  #$0
802F: B1 83     65          LDA  ($83),Y     ;Move pointers to work area
8031: AA        66          TAX              ;Transfer len to X
8032: C8        67          INY
8033: B1 83     68          LDA  ($83),Y
8035: 85 1A     69          STA  STRPTR      ;Low byte of data location
8037: C8        70          INY
8038: B1 83     71          LDA  ($83),Y
803A: 85 1B     72          STA  STRPTR+1    ;High byte of data location
803C: A0 00     73  FRONT   LDY  #$0
803E: B1 1A     74          LDA  (STRPTR),Y  ;Check front of string for spaces
8040: C9 20     75          CMP  #'          ' ;There's a space in there
8042: D0 10     76          BNE  EXDIV       ;Check for '*' if non-zero
8044: CA        77          DEX              ;Decrement length byte
8045: D0 05     78          BNE  NXT1
8047: 8A        79          TXA
8048: A8        80          TAY              ;Filling registers with zero
8049: 91 83     81          STA  ($83),Y     ;Leave with zero length byte, since
804B: 60        82          RTS              ;string was all spaces.
804C: E6 1A     83  NXT1    INC  STRPTR
804E: D0 EC     84          BNE  FRONT       ;Keep checking for more leading spaces.
8050: E6 1B     85          INC  STRPTR+1
8052: D0 E8     86          BNE  FRONT       ;
8054: C9 2A     87  EXDIV   CMP  #'*'        ;EX-DIVIDEND flag. Remove. Of no use to us.
8056: D0 0E     88          BNE  FNDFRAC     ;Skip this part if not an asterisk
                89  *
                90  * IF GET HERE, NEED TO SHORTEN SYMBOL
                91  *
                92  * Y IS STILL 0
                93  *
8058: CA        94          DEX              ;Shorten len byte
8059: D0 05     95          BNE  NXT3        ;Only continue if length > 0
805B: 8A        96          TXA
805C: A8        97          TAY              ;This is just like you saw before
805D: 91 83     98          STA  ($83),Y     ;to exit with length = 0
805F: 60        99          RTS
8060: E6 1A     100 NXT3    INC  STRPTR      ;Change string pointer to start after
8062: D0 02     101         BNE  FNDFRAC                                    asterisk
8064: E6 1B     102         INC  STRPTR+1
                103 *
                104 * ABOVE CORRECTS LENGTH
                105 *
```

WHAT'S THE DIF?

According to the Technical Specification, a program reading a DIF™ file can elect to ignore the Value Indicator; the information is there if you need it. If you are writing a program to output a DIF™ file for THE Spreadsheet 2.0 or VisiCalc, you will use the Value Indicator to communicate more information about your data. You must supply a Value Indicator. It must *not* be in quotes.

1 : If the Type Indicator is 1, the data record represents a string. The number value is zero. The second line contains the actual string. It's good practice to enclose such a string in quotes. You *must* use quotes if your string contains "illegal" characters, such as the comma or colon.

The accompanying tables give examples which will make understanding this somewhat easier.

The last data record is the Special Data Value for End Of Data, which looks like this:

```
-1,0
EOD
```

Some operating systems can't tell when they're at the end of the file. Apple DOS 3.3, for example, dies and goes to heaven quite unexpectedly when trying to read past the end of the file. The Special Data Value EOD gives you a way to know you've reached the end.

I wrote the accompanying program to handle string information obtained previously by one or another telecommunications program, and saved in a standard Apple Sequential Text File. The file contains a known number of records, which are to be arranged in a known, fixed manner. I thus include the dimensional information in the body of the program. For simplicity of illustration, I have replaced the disk I/O with a brief list of DATA statements in the Applesoft program. These statements are identical to the strings normally obtained from Dow Jones News/Retrieval.

```
                    106  * X-REG STILL CONTAINS LENGTH
                    107  *
8066: A0 00         108  FNDFRAC LDY  #$00        ;Save pointer & length info
8068: 8A            109          TXA
8069: 91 83         110          STA  ($83),Y
806B: C8            111          INY
806C: A5 1A         112          LDA  STRPTR
806E: 91 83         113          STA  ($83),Y
8070: C8            114          INY
8071: A5 1B         115          LDA  STRPTR+1
8073: 91 83         116          STA  ($83),Y
8075: E0 04         117          CPX  #$04
8077: B0 01         118          BCS  FND0        ;Need length of 4 or more to hold fraction
8079: 60            119          RTS              ;If branch not taken, quit -- too short
807A: A0 00         120  FND0    LDY  #$0
807C: 84 08         121          STY  STROFFST    ;Lots of indirect addressing coming up
807E: 84 09         122          STY  TBLOFFST
8080: B1 1A         123  FND1    LDA  (STRPTR),Y ;Examine string until another space found
8082: C9 20         124          CMP  #'          ' ;SPACE?
8084: F0 09         125          BEQ  LOOKUP      ;If space found, there may be a fraction
8086: C9 2F         126          CMP  #'/'        ;SLASH? ;If slash found before space,
8088: F0 07         127          BEQ  LOOK1       ;this is only a fraction; convert at once.
808A: C8            128          INY              ;If neither found, keep looking.
808B: CA            129          DEX
808C: D0 F2         130          BNE  FND1        ;But only look until no length left
808E: 60            131          RTS              ;Got to end of string.  Must be integer
                    132  *
                    133  *
                    134  *
808F: 84 08         135  LOOKUP  STY  STROFFST    ;This is where the decimal point will go.
8091: A0 00         136  LOOK1   LDY  #$0         ;Start scanning the fraction table.
8093: B1 83         137          LDA  ($83),Y
8095: AA            138          TAX              ;Transfer len to X
8096: A4 08         139  LOOK2   LDY  STROFFST
8098: F0 01         140          BEQ  YSAVE       ;If Y = 0, skip next part
809A: C8            141          INY              ;Index past space char
809B: 84 02         142  YSAVE   STY  YTEMP
809D: A4 09         143  LOOK3   LDY  TBLOFFST
809F: E6 09         144          INC  TBLOFFST
80A1: B1 04         145          LDA  (FRCTABLE),Y ;Examine the table
80A3: F0 41         146          BEQ  EXIT        ;Zero marks the end of the table
80A5: 30 0A         147          BMI  FINAL       ;High bit set on last byte of each fraction
80A7: A4 02         148          LDY  YTEMP       ;Have to keep swapping values in Y register
80A9: E6 02         149          INC  YTEMP
80AB: D1 1A         150          CMP  (STRPTR),Y ;Do we have a match?
80AD: D0 E7         151          BNE  LOOK2       ;No, examine the next fraction
80AF: F0 EC         152          BEQ  LOOK3       ;Maybe.  Keep checking bytes.
```

business

Table 1 is the DIF™ file output by the program. Notice that it contains more header records than the mandatory four. Table 2 is the same data as read by VisiPlot™ from the DIF™ file. Table 3 is the same data as read by THE Spreadsheet 2.0 from the DIF™ file. Table 4 is a DIF™ file output by THE Spreadsheet 2.0, with a few text items included to illustrate the Text type of data element in a DIF™ TUPLE. Notice that this file does not contain so-called "optional" header items.

Listing 1 is the program itself. Listing 2 is a relocatable machine code utility to convert numeric information expressed as algebraic fractions to decimal fractions. It has the further function of stripping leading and trailing spaces from a string containing such a value. The string it returns can be evaluated by the Applesoft VAL function. The string can also be written to disk as a string, and later read back into a numeric variable.

Conversion occurs by changing to decimal equivalents the string bytes containing the fraction; the string pointer and length byte are adjusted as necessary and no garbage is generated. The utility is quite fast. It will only work with the algebraic fractions shown in Listing 2, since it uses a lookup table.

```
80B1: 29 7F      153 FINAL    AND  #$7F        ;Check the last byte now.
80B3: A4 02      154          LDY  YTEMP
80B5: D1 1A      155          CMP  (STRPTR),Y  ;Match?
80B7: D0 D8      156          BNE  LOOK1       ;No, keep looking.
80B9: 38         157          SEC              ;Yes. Now obtain the decimal equivalent
80BA: A5 02      158          LDA  YTEMP       ;from DECTABLE
80BC: E5 08      159          SBC  STROFFST    ;and modify string length to drop
80BE: C9 03      160          CMP  #$03        ;trailing spaces.  Make sure length
80C0: 90 CF      161          BCC  LOOK1       ;is at least 4 bytes, to hold fraction.
                 162 *
                 163 *
                 164 *
80C2: A2 04      165          LDX  #$04
80C4: A4 09      166 CONVERT  LDY  TBLOFFST
80C6: E6 09      167          INC  TBLOFFST
80C8: B1 06      168          LDA  (DECTABLE),Y
80CA: A4 08      169          LDY  STROFFST
80CC: E6 08      170          INC  STROFFST
80CE: 91 1A      171          STA  (STRPTR),Y  ;Store the value over the old one.
80D0: CA         172          DEX
80D1: D0 F1      173          BNE  CONVERT
80D3: A0 00      174          LDY  #$0
80D5: B1 1A      175 FIXLEN   LDA  (STRPTR),Y
80D7: C9 2E      176          CMP  #'.'        ;LOOK FOR D.P.
80D9: F0 03      177          BEQ  CLOSE
80DB: C8         178          INY
80DC: D0 F7      179          BNE  FIXLEN
80DE: 98         180 CLOSE    TYA
80DF: 18         181          CLC
80E0: 69 04      182          ADC  #$04
80E2: A0 00      183          LDY  #$0
80E4: 91 83      184          STA  ($83),Y
80E6: 60         185 EXIT     RTS
80E7: 20 31 2F   186 FRACTIONS DCI  ' 1/16'
80EA: 31 B6
80EC: 20 32 2F   187          DCI  ' 2/16'
80EF: 31 B6
80F1: 20 20 31   188          DCI  '  1/8'
80F4: 2F B8
80F6: 20 33 2F   189          DCI  ' 3/16'
80F9: 31 B6
80FB: 20 34 2F   190          DCI  ' 4/16'
80FE: 31 B6
8100: 20 20 31   191          DCI  '  1/4'
8103: 2F B4
8105: 20 35 2F   192          DCI  ' 5/16'
8108: 31 B6
810A: 20 36 2F   193          DCI  ' 6/16'
810D: 31 B6
810F: 20 20 33   194          DCI  '  3/8'
8112: 2F B8
8114: 20 37 2F   195          DCI  ' 7/16'
8117: 31 B7
8119: 20 38 2F   196          DCI  ' 8/16'
811C: 31 B6
811E: 20 20 31   197          DCI  '  1/2'
8121: 2F B2
8123: 20 39 2F   198          DCI  ' 9/16'
8126: 31 B6
8128: 31 30 2F   199          DCI  '10/16'
812B: 31 B6
812D: 20 20 35   200          DCI  '  5/8'
8130: 2F B8
8132: 31 31 2F   201          DCI  '11/16'
8135: 31 B6
8137: 31 32 2F   202          DCI  '12/16'
813A: 31 B6
813C: 20 20 33   203          DCI  '  3/4'
813F: 2F B4
8141: 31 33 2F   204          DCI  '13/16'
8144: 31 B6
8146: 31 34 2F   205          DCI  '14/16'
8149: 31 B6
814B: 20 20 37   206          DCI  '  7/8'
814E: 2F B8
8150: 31 35 2F   207          DCI  '15/16'
8153: 31 B6
8155: 00         208          HEX  00
8156: 20 20 20   209 DECIMALS ASC  '     '
8159: 20 20
815B: 2E 30 36   210          ASC  '.063 '
815E: 33 20
```

business

WHAT'S THE DIF?

I normally use The Routine Machine from Southwestern Data Systems to append the utility to my programs; it is completely relocatable despite the fact that it contains two lookup tables. The utility could easily be incorporated into an Amper-Library as described by Bill Parker in the June 1983 issue. For the program in Listing 1, I show it being BLOAD-ed from disk, and the ampersand "pointed" to it by the program, all in line 210.

The best examples I've seen of programs to read DIF™ files are in Douglas Hergert's new book, *Mastering VisiCalc*. He provides a set of subroutines for Apple, and other computers, to both read and write DIF™ files. The subroutines could be kept in a text file, and simply EXEC-ed into any program you're developing.

Once the file structure of DIF™ is understood, it should be relatively straightforward to write programs which can make use of it. Over time, the typical business user accumulates substantial amounts of data, which may become one of the business' most valuable assets. The ability to readily make use of this data within a variety of different programs adds increasingly to its value, as the complexity and extent of the files grow.

```
8160: 2E 31 32   211          ASC   '.125 '
8163: 35 20
8165: 2E 31 32   212          ASC   '.125 '
8168: 35 20
816A: 2E 31 38   213          ASC   '.188 '
816D: 38 20
816F: 2E 32 35   214          ASC   '.25  '
8172: 20 20
8174: 2E 32 35   215          ASC   '.25  '
8177: 20 20
8179: 2E 33 31   216          ASC   '.313 '
817C: 33 20
817E: 2E 33 37   217          ASC   '.375 '
8181: 35 20
8183: 2E 33 37   218          ASC   '.375 '
8186: 35 20
8188: 2E 34 33   219          ASC   '.438 '
818B: 38 20
818D: 2E 35 20   220          ASC   '.5   '
8190: 20 20
8192: 2E 35 20   221          ASC   '.5   '
8195: 20 20
8197: 2E 35 36   222          ASC   '.563 '
819A: 33 20
819C: 2E 36 32   223          ASC   '.625 '
819F: 35 20
81A1: 2E 36 32   224          ASC   '.625 '
81A4: 35 20
81A6: 2E 36 38   225          ASC   '.688 '
81A9: 38 20
81AB: 2E 37 35   226          ASC   '.75  '
81AE: 20 20
81B0: 2E 37 35   227          ASC   '.75  '
81B3: 20 20
81B5: 2E 38 31   228          ASC   '.813 '
81B8: 33 20
81BA: 2E 38 37   229          ASC   '.875 '
81BD: 35 20
81BF: 2E 38 37   230          ASC   '.875 '
81C2: 35 20
81C4: 2E 39 33   231          ASC   '.938 '
81C7: 38 20

--End assembly, 457 bytes, Errors: 0
```

```
]LIST

5  REM

 DIF DEMO BY DAVID G SPARKS

CALL -A.P.P.L.E. : NOV. 1983

10 STK$ = "XYZ"
20 D$ =  CHR$ (4)
30  DATA 5
40  DATA "07/01/83  14 1/2    14
     1/8    14 3/8          434"
41  DATA "07/02/83  14 7/8    14
     1/4    14 1/2          551"
42  DATA "07/05/83  15        14
     1/2    14 3/4         1071"
43  DATA "07/06/83  15        14
     1/8    14 1/8          303"
44  DATA "07/07/83  14 3/4    14
     1/4    14 1/2          578"
50  DATA "HIGH","LOW","CLOSE","VO
    LUME"
90  REM
DIM ARRAYS, READ DATA INTO THEM

100  READ SIZE:SIZE = SIZE - 1: REM

ADJUST SIZE FOR ARRAY DIMENSIONS
110  DIM A$(SIZE): DIM B$(3,SIZE)
120  FOR X = 0 TO SIZE: READ A$(X
    ): NEXT
130  DIM C$(3): FOR X = 0 TO 3: READ
    C$(X): NEXT : REM  NAMES OF
    COLUMNS FOR DIF FILE
200  REM
LOAD CONVERT ROUTINE INTO INPUT
BUFFER A SAFE PLACE DURING THIS
PORTION OF PROGRAM.

210  PRINT D$;"BLOAD CONVERT,A$20
    1": POKE 1013,76: POKE 1014,
    1: POKE 1015,2: REM  SET UP
    AMPERSAND, TOO.  DON'T LOAD
    AT $200 - WON'T WORK THERE.
1060  REM
BREAK A$ LINES INTO PIECES IN B$

1070  FOR Y = 0 TO SIZE: FOR X =
    0 TO 3
1080 B$(X,Y) =  MID$ (A$(Y),10 *
    (X + 1) + 1,10)
1090  NEXT : NEXT
1095  REM
CONVERT B$ ELEMENTS TO
DECIMAL FRACTIONS

1100  FOR Y = 0 TO SIZE: FOR X =
    0 TO 3: & ,B$(X,Y): NEXT
1103  REM
```

business

New operating systems for the super-expensive computers, such as Lisa from Apple, have recognized this. Indeed, the price of such systems is often justified to the purchaser because of the interchangeability of the data between programs. DIF™ files afford the most widely distributed method of communicating data between programs operating under Apple DOS. While not quite as convenient as the systems costing thousands of dollars more, they are cost-effective for the personal user of the Apple II.

```
IF B$(2,Y) IS BLANK, THAT
INDICATES AN OVER-THE-COUNTER
SECURITY. IN THAT CASE, USE THE
BID AS THE LAST PRICE.

1110  IF B$(2,Y) = "" THEN B$(2,Y
     ) = B$(0,Y):B$(0,Y) = B$(1,Y
     ):B$(1,Y) = B$(2,Y)
1120  NEXT
1125  REM
PRINT THE DIF FILE

1130  PRINT D$;"OPEN";STK$;".DIF"

1140  PRINT "WRITING ";STK$;".DIF
      ": PRINT
1160  PRINT D$;"WRITE";STK$;".DIF
     "
1170  PRINT "TABLE": PRINT "0,1":
      PRINT  CHR$ (34);STK$;".DIF
     "; CHR$ (34)
1180 Q$ =  CHR$ (34) +  CHR$ (34)

1190  PRINT "VECTORS": PRINT "0,4
     ": PRINT Q$
1200  PRINT "TUPLES": PRINT "0,";
     SIZE + 1: PRINT Q$
1230 Q1$ =  CHR$ (34) + "1" +  CHR$
     (34)
1240 Q2$ =  CHR$ (34) +  STR$ (SI
     ZE + 1) +  CHR$ (34)
1250  FOR X = 1 TO 4
1260  PRINT "LABEL": PRINT X;",1"
     : PRINT  CHR$ (34);STK$;" ";
     C$(X - 1); CHR$ (34)
1270  PRINT "PERIODICITY": PRINT
     X;",0": PRINT Q1$
1280  PRINT "MAJORSTART": PRINT X
     ;",0": PRINT Q1$
1290  PRINT "MINORSTART": PRINT X
     ;",0": PRINT Q1$
1300  PRINT "TRUELENGTH": PRINT X
     ;",0": PRINT Q2$
1310  NEXT
1320  PRINT "DATA": PRINT "0,0": PRINT
     Q$
1330  FOR Y = 0 TO SIZE
1340  PRINT "-1,0": PRINT "BOT"
1350  FOR X = 0 TO 3
1360  PRINT "0,";B$(X,Y): PRINT "
     V"
1370  NEXT : NEXT
1380  PRINT "-1,0": PRINT "EOD"
1390  PRINT D$;"CLOSE"
```

TABLE 1 — THE DIF FILE CREATED BY LISTING 1

```
TABLE
0,1
"XYZ.DIF"
VECTORS
0,4
""
TUPLES
0,5
""
LABEL
1,1
"XYZ HIGH"
PERIODICITY
1,0
"1"
MAJORSTART
1,0
"1"
MINORSTART
1,0
"1"
TRUELENGTH
1,0
"5"
LABEL
2,1
"XYZ LOW"
PERIODICITY
2,0
"1"
MAJORSTART
2,0
"1"
MINORSTART
2,0
"1"
TRUELENGTH
2,0
"5"
LABEL
3,1
"XYZ CLOSE"
PERIODICITY
3,0
"1"
MAJORSTART
3,0
"1"
MINORSTART
3,0
"1"
TRUELENGTH
3,0
"5"
LABEL
4,1
"XYZ VOLUME"
PERIODICITY
4,0
"1"
MAJORSTART
4,0
"1"
MINORSTART
4,0
"1"
TRUELENGTH
4,0
"5"
DATA
0,0
""
-1,0
BOT
0,14.5
V
0,14.125
V
0,14.375
V
0,434
V
-1,0
BOT
0,14.875
V
0,14.25
V
0,14.5
V
0,551
V
-1,0
BOT
0,15
V
0,14.5
V
0,14.75
V
0,1071
V
-1,0
BOT
0,15
V
0,14.125
V
0,14.125
V
0,303
V
-1,0
BOT
0,14.75
V
0,14.25
V
0,14.5
V
0,578
V
-1,0
EOD
```


References:

"DIF Technical Specification." DIF Clearinghouse, P.O. Box 638, Newton Lower Falls, MA 02162. 1983.

Hergert, Douglas. "Mastering VisiCalc." Berkeley, CA: SYBEX, Inc. 1983. chapters 6–8.

Ross, Steve. "THE Spreadsheet" documentation. A.P.P.L.E. 1983.

business

WHAT'S THE DIF?

TABLE 2 — RESULTS OF READING XYZ.DIF INTO VISIPLOT

NAME	PER	START	END	#
XYZ HIGH	1	1	5	5
XYZ LOW	1	1	5	5
XYZ CLOSE	1	1	5	5
XYZ VOLUME	1	1	5	5

DATE	XYZ HIGH
1	14.5
2	14.875
3	15
4	15
5	14.75

DATE	XYZ LOW
1	14.125
2	14.25
3	14.5
4	14.125
5	14.25

DATE	XYZ CLOSE
1	14.375
2	14.5
3	14.75
4	14.125
5	14.5

DATE	XYZ VOLUME
1	434
2	551
3	1071
4	303
5	578

TABLE 3 — RESULTS OF READING XYZ.DIF INTO SPREADSHEET 2.0

(NOTE: Column headings added manually, not read from DIF file by Spreadsheet 2.0)

HIGH	LOW	CLOSE	VOLUME
14.5	14.125	14.375	434
14.875	14.25	14.5	551
15	14.5	14.75	1071
15	14.125	14.125	303
14.75	14.25	14.5	578

TABLE 4 — DIF(TM) FILE OUTPUT BY SPREADSHEET 2.0 WHEN IT CONTAINED TABLE 3 AS ITS WORKSHEET

```
TABLE                   "LOW"
0,1                     1,0
""                      "CLOSE"
VECTORS                 1,0
0,4                     "VOLUME"
""                      -1,0
TUPLES                  BOT
0,10                    0,14.5
""                      V
DATA                    0,14.125
0,0                     V
""                      0,14.375
-1,0                    V
BOT                     0,434
1,0                     V
"(NOTE:"                -1,0
1,0                     BOT
"Column"                0,14.875
1,0                     V
"heading"               0,14.25
1,0                     V
"s added"               0,14.5
-1,0                    V
BOT                     0,551
1,0                     V
"manuall"               -1,0
1,0                     BOT
"y, not "               0,15
1,0                     V
"read fr"               0,14.5
1,0                     V
"om DIF"                0,14.75
-1,0                    V
BOT                     0,1071
1,0                     V
"file by"               -1,0
1,0                     BOT
" Spread"               0,15
1,0                     V
"sheet 2"               0,14.125
1,0                     V
".0)"                   0,14.125
-1,0                    V
EOT                     0,303
1,0                     V
""                      -1,0
1,0                     BOT
""                      0,14.75
1,0                     V
""                      0,14.25
1,0                     V
""                      0,14.5
-1,0                    V
BOT                     0,578
1,0                     V
"HIGH"                  -1,0
1,0                     EOD
```

business

STRICTLY BUSINESS

Mike Regeimbal

Introduction

MICROMANIA is the only word that can adequately express what is happening in the personal computer market today. Up until now, only those people having a need for the latest fad to hit the market have been indulging themselves with this newfound toy. The profile of the personal computer buyer is rapidly changing. One of the target market groups to participate in this evolution, the group to which this column addresses itself, is management.

Past Wall Street Journal articles have indicated that management is reluctant to embrace the computer for a variety of reasons. It is my opinion that management is in the process of doing a complete flip–flop on this issue. Management was never really against the computer, but fear has made them leary. The term fear, however, is relative. The majority of literature today would have you believe that cost is the predominant factor in the prolific dissemination of the personal computer among middle management. Not to completely discount cost, I propose that a more predominant factor is subtle pressure from above.

According to Everett M. Rodgers in his book *Diffusion of Innovations,* new product purchase patterns can be broken down into five areas. The innovators represent the first 3% of total market purchases. Early adopters represent the next 13%. The early majority and late majority each represent 34% and laggards pull up the rear with the last 16%.

T. S. Robertson writes in *Innovation and the Consumer* that the three demographic factors most affecting consumer innovativeness are income, education, and occupational status.

As long as upper management was sufficiently ignorant of computers, middle management could carry on in the same manner, even though the majority were fairly well off and certainly well educated. However when HAL's little brother entered the picture, all of a sudden it became very fashionable for upper management to own personal computers. This is probably due to its non–fruity, well respected brand familiarity within the business community.

Thus the personal computer industry with the help of upper management's sudden awareness of the P.C. has finally passed from the innovator stage into the early adopter stage. After all, one of the first things you learn in any organization is that information flows a lot easier from the top down rather than the bottom up. Middle management, in part, is now buying a P.C. for job security, or for prestige and esteem, according to Abraham Maslow's theory of mans' hierarchy of needs.

That brings us to the objective of this column. Assuming the personal computer is being purchased by middle management to impress the boss, I would assume there are quite a few of you who would like to accomplish more with your investment than chalking it up as an educational tool for the kids. Listen up, *Call –A.P.P.L.E.* is here to help. Yes, with the help of you and your business brethren we are going to develop a column that should help us over a few of the hurdles to efficiently utilize this new tool and hopefully bring us closer to attaining Maslow's final step in his hierarchy of needs, that of self actualization.

Because this is a joint effort, you must let me know what is on your mind. What are you interested in hearing about? What would you desire sharing with your fellow professionals? I only ask that you minimize the "computereez" within the comments you have to share. After all the name of this column is *Strictly Business.*

I propose that the format we use for future columns contain four sections. The first will be a general discussion about some particular aspect of computing in business. The second will be a section on software or hardware sent to *Call –A.P.P.L.E.* for review. The next section will review a book on computing, which hopefully will have a business/management slant to it. Reader feedback will be the theme for the last section. You are encouraged to participate in the development of any or all of these sections.

Since I am the new kid on the block, let me take a few lines to introduce myself. The name is pronounced just like it is spelled "Regeimbal." I've had a tough time with that all my life. While I work for Boeing Computer Services, I do not consider myself a computer jock. My past employment opportunities have included such jobs as farm labor, vacuum cleaner sales, school bus driver, inventory control clerk, public accounting, industrial engineering, and currently internal audit.

To stay abreast of the auditing profession, I am currently president of the Puget Sound Chapter of the Institute of Internal Auditors and belong to the American Institute of Certified Public Accountants, Washington Society of CPA's, and Kent chapter of Toastmasters International. With Boeing's help and a little perseverance, the hurdles of Seattle University's MBA program were overcome.

STRICTLY BUSINESS

First and foremost though, I've always thought of myself as a manager. Period. I enjoy reading good management related books, Peter Drucker in particular. Sailing helps me keep life in perspective and saving the best for last, Rachel, Leslie, and Justin give it meaning. Now that you know a little about me, I hope you give me the opportunity to know a little about you. With all the formalities out of the road let's move on.

Software Review

Along with the Apple][plus computer, I purchased a 9" monitor, GX-100 printer, and two disk drives. The good folks at *Call -A.P.P.L.E.* were nice enough to give me a copy of PIE WRITER by Hayden Software for review in this column and as a means of putting together these first words of wisdom. With bubbling enthusiasm, I immediately set out to express my joy at being the proud parent of this new addition to the family. My father, in times past, has verbalized restraint during those periods when he felt this exuberance should be constructively sedated. "Be sure brain is engaged before putting mouth in motion."

After going through the tedious process of formatting the program to my computer, I patiently eased myself down the learning curve to a point where the text for this column could be entered. Once underway, there was no stopping this composer. It was like a runaway locomotive. A period here, an underline there, almost a piece of art. Having assembled what I felt would be sure to win the next Nobel prize, I attempted to print out the file. The first two lines of text looked exactly like I had input them. Subsequently utter chaos prevailed.

The printer started displaying characters which were not only a secret to the Apple plus keyboard but looked more like hieroglyphics than any discernable characters of the Anglo-Saxon variety. Who knows, maybe there is some obscure Aborigine tribe that could read this first rough, rough, draft. Realizing that something had went awry, I immediately tried to call up the file for viewing on the screen. No such luck. Investigating further, the file I had originally given the name "COLUMN 1" was now changed in the catalog to the same obscure hieroglyphics embellished on the printer. It was then that Dad's proverb reared its ugly head. I had made the classic mistake of not copying to a backup file. My Nobel Prize was lost forever.

Not to be dissuaded, I decided to delve more deeply into the documentation provided by Hayden before attempting the same fatal mistakes again. PIE WRITER is set up in four distinct sections, Text Editor, Text Processor, Pie Configure, and Format Configure. Assuming that the problem existed in the Pie or Format Configure, I zeroed in on those two sections as a means of resolving the problem. No such luck.

Being a neophyte to the world of personal computers, I decided it was time to call in the big guns. Having a computer engineer for a friend helps. But what do you do when the pro says no go? Figuring that my kids may have taken the magnetic letters off the refrigerator and run them across the PIE WRITER master, I went back to *Call -A.P.P.L.E.* for a new version of the master and struck out again.

By this time I was out about 20 hours of time just trying to get the confounded program to run, a spaghetti dinner in payment of consulting services for the engineer, and I was thoroughly frustrated. To the rescue came ZARDAX. I can say unequivocally if you are going to put out hard earned money on a word processing program, and you are not a masochist, forget about PIE WRITER. ZARDAX is everything PIE WRITER is not. On the other hand, you should probably give some consideration to the cost differences.

ZARDAX is easy to use, logically ordered, and contains a minimum of computereez. Compared to the many hours I spent pouring over the PIE WRITER program, the only documentation I have had to refer to with ZARDAX are the two back pages listing all the commands. ZARDAX programers must have followed the same routine now advocated as the most effective means of presenting information to upper management, "KISS" which stands for *keep it simple stupid.* My kind of word processing program.

Book Review

The book of the month selection is titled *Without Me You Are Nothing,* written by Frank Herbert, who also wrote the *DUNE* trilogy. This book gives a good straightforward explanation of how a personal computer works. Just as people of different dialects and customs think in different logic patterns, so does a computer.

Through the first part of the book, Herbert does an exemplary job of examining the logic of the computer (i.e. switching) as a basis for effective communication. RAM's, ROM's, branching and the use of clocks are just a few of the terms and concepts explained. The body of the book deals with the purchase of a personal computer, setting it up, and getting that first program going. The latter part of the book addresses programming in general using BASIC language.

Herbert explains the need for mapping out program logic before actually writing code. He offers PROGRAMAP, which uses pictures as a means of graphically laying out a computer program, as an alternative to the traditional flowcharting diagram. In his opinion, traditional flowcharting symbols can be clumsy and awkward, while PROGRAMAP presents a clear concise one-dimension diagram using the ordinary road map as a guide. Because my BASIC programming experience is limited at best, I will only say that his approach to flowcharting looks interesting and leave it to the reader to pass on its merits. If you have an opinion one way or the other, let me know.

Next month we are going to go over the concept of return on investment. Are you getting your money's worth out of your personal computer? The book review will be of *Personal Guide to Personal Computers* by Peter Lundstrom. See you then.

business

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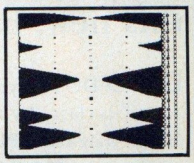

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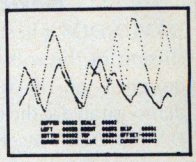

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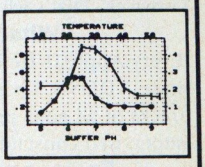

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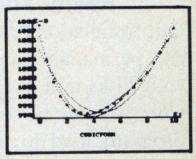

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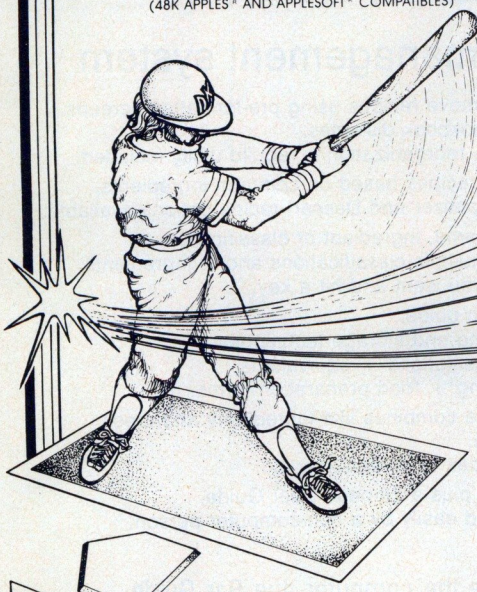

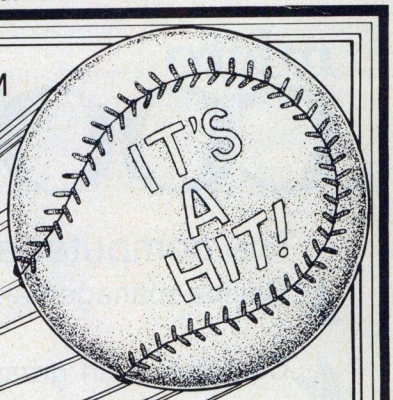

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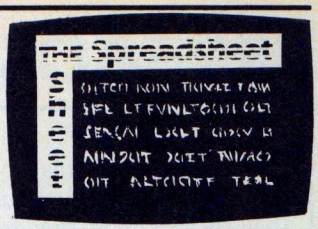
THE SPREADSHEET SHEET:

SPREADSHEETS IN THE CLASSROOM (Part Two)

Jeffrey M. Jacques, Ph.D.



Introduction

WELCOME back to the second in our series on applications of THE Spreadsheet. Last time we began working on a grade management template. More specifically, we created a class gradebook which: (1) established a class roster, (2) kept track of student test scores, and (3) provided some statistical summaries of class performance on each test. We noted also that it was easy to edit entries, provide back-up copies and easy retrieval, and modify this class management template so that it could be used in an assortment of courses.

In this issue, we shall complete our template by: (1) computing the remaining summary statistics of variance and standard deviation, (2) computing and assigning grades on tests, and (3) combining test scores to determine and assign grades at the end of the grading period. We shall explore two methods for assigning grades — the percent of material mastered and the curve. We will show how to use THE Spreadsheet @LOOKUP table function in the assignment of grades. So, let's get started.

Completing our Statistical Summary

In order to effectively use some of the functions of THE Spreadsheet, it is important to set aside sufficient workspace in your template. Therefore, after loading your worksheet created last time, identify row 29 as the starting point for computational space. On row 34, enter the labels for "Student's Name" in column A. Use rows 33 and 34 to enter Stud. PTS — test or quiz grade — in column B, and the expression: (Score- mean)^2 in column C.

Then use the /Reproduce command to replicate the students' name/number in column A, rows 6 through 15 to rows 36 through 45. Simply enter /R, press the ESC key twice, then enter A6...A16: A36...A45 and all the labels will be copied to these cells. This will save considerable time and effort. Similarly, /Reproduce the test scores from column B, rows 6 through 15 to rows 36 through 45. The conceptually easiest way to compute the variance and standard deviation for any test or quiz is to simply follow the standard formula:

$$\text{variance} = \frac{\text{@SUM((Student's score - mean)}\wedge 2)}{\text{Number of students taking the test}}$$

Next compute the standard deviation by simply taking the square root of the variance. For those of you who do not remember, the standard deviation is useful since it helps to define the proportion of scores which fall within known limits of the mean score. We can expect, for example, in a distribution which is more or less normal, approximately: 68% of all the students' scores falling between +1 and -1 standard deviation units from the mean value and 95% of all the students' scores falling between +2 and -2 standard deviation units from the mean value. Hang on to this idea. We'll come back to it when we examine alternate methods of grade assignment.

But before we talk about using these values to determine student grades, let's compute the variance and standard deviation for Test #1. First, we'll make sure that the values of B6 through B15 have been replicated successfully into cells B36 through B45 by taking a few moments and invoking the functions of @SUM, @COUNT, and @AVERAGE in the appropriate cells. Compare these values with those you computed last time. They should be identical.

We'll use the @AVERAGE value as part of the equation to compute the variance. In column C, rows 36 through 45 we'll enter the values need for the calculation of the variance. For each of the students, take from their score the average score and then square the resulting value, i.e., in cell C36, enter the formula: (B36-B49)^2 . Simply /Reproduce this formula, enter R for relative to the first query, and then N for No Change to the second query. A simple press of the ! key will yield the correct values. Now, @SUM this column by entering in cell C47 the function: @SUM(C36...C45).

To compute the variance, divide this value by the number of scores and enter in cell C50 the formula: +C47/C48 . To find the standard deviation, simply take the square root of this value by entering in C51 the function: @SQRT(C50) . Since we will be doing this as many times as there are different tests to report, enter these results in rows 23 and 24 of your original worksheet. (So that you may check your results, the variance for Test 1 was 7.84 and the standard deviation was 2.8.)

Assigning Grades and Using The @LOOKUP Function

In column D of our worksheet, we will compute the percent of the items each student answered correctly. If you wish to have THE Spreadsheet round off the percent correct for each student, then you may simply divide the student's test score by the number of possible correct answers, (e.g., for Student # 1, simply enter the formula: +B36/B18*100 into cell D36.

If rounding off, using the percent correct to assign grades is of interest to you, then, for Student # 1, you may wish to compute the percent correct with the use of the following formula entered into cell D36:

@INT(((B36/B18)*100 + .5))/100

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SPREADSHEETS IN THE CLASSROOM (Part Two)

Take a minute and convince yourself that this little formula works. There's no rush. Once you convince yourself, then /Reproduce this formula from row 36 through row 45. Make sure that you answer Relative for the numerator (+B36) and No Change for the denominator (+B18). Check your formulae with those listed in Table 4. (We used Tables 1 through 3 in the last issue.)

You've probably noticed the LOOK-UP functions in column E and a LOOK-UP table in the right quadrant of Table 4. Let's examine it more closely and see how to use it effectively. Okay, in columns F and G set up your LOOK-UP table. What's a LOOK-UP table? Well, it's simply a two column list of values. On the basis of what is listed in the first column — from lowest to highest, THE Spreadsheet returns the value listed in the column immediately to its right. (To help keep track of what the values mean, we will use column H to list the letter grade.) In my class, any student getting less than 60% of the test items correct fails (0) the examination. Enter a zero, therefore, in cell F36. Students who get less than 70% of the items correct earn a "D" (or a "1"), if they get less than 80% of the items correct they earn a "C" (or a "2"), if they get less than 90% of the items correct they earn a "B" (or a "3"), and they earn an A (or a "4") if they get 90% or more of the items correct. Enter a 60, 70, 80 and 90 in cells F37 through F40, respectively.

Say what? That's good theory, but I wish to see how it works. In column E, rows 33 and 34, enter the column label "Number Grade." In cell E36, enter the function:

@LOOKUP(D36,F36...F39)

It works in the following manner. Take the value stored in D36 (i.e., Student # 1 percent correct score), find the value which is equal to or less than that listed in cells F36 through F40. For example, if Student #1 scored 15 correct answers of 20 questions, or 75% on the first test, then the value referenced would be "70" (cell F38) and THE Spreadsheet will return a value of "2" (cell G38) to cell D36. Now, /Reproduce this function in cells D37 through D45. Press the ! command and all the appropriate values will be used. (Hmm, only two students earned Bs and most of the other students had some trouble with the first test, apparently.)

TABLE 4. COMPUTATIONAL SPACE AND GRADE ASSIGNMENT

	A	B	C	D	E	F	G	H
28								
29				Computational Space				
30								
31								
32								
33		Stud.	(Score-	PCT.	NUMBER	Look Up Table		
34	Student Name	PTS	mean)^2	CORR.	GRADE	PTS	Grade	
35								
36	Student # 1	+B6	(B36-B49)^2	@INT(B36/B18)*100+.5))/100	@LOOKUP(D36,F36...F39)	0	0	F
37	Student # 2	+B7	(B37-B49)^2	@INT(B37/B18)*100+.5))/100	@LOOKUP(D37,F36...F39)	60	1	D
38	Student # 3	+B8	(B38-B49)^2	@INT(B38/B18)*100+.5))/100	@LOOKUP(D38,F36...F39)	70	2	C
39	Student # 4	+B9	(B39-B49)^2	@INT(B39/B18)*100+.5))/100	@LOOKUP(D39,F36...F39)	80	3	B
40	Student # 5	+B10	(B40-B49)^2	@INT(B40/B18)*100+.5))/100	@LOOKUP(D40,F36...F39)	90	4	A
41	Student # 6	+B11	(B41-B49)^2	@INT(B41/B18)*100+.5))/100	@LOOKUP(D41,F36...F39)			
42	Student # 7	+B12	(B42-B49)^2	@INT(B42/B18)*100+.5))/100	@LOOKUP(D42,F36...F39)			
43	Student # 8	+B13	(B43-B49)^2	@INT(B43/B18)*100+.5))/100	@LOOKUP(D43,F36...F39)			
44	Student # 9	+B14	(B44-B49)^2	@INT(B44/B18)*100+.5))/100	@LOOKUP(D44,F36...F39)			
45	Student #10	+B15	(B45-B49)^2	@INT(B44/B18)*100+.5))/100	@LOOKUP(D45,F36...F39)			
46								
47	Sum	@SUM(B36...B45)	@SUM(C36...C45)					
48	Count	@COUNT(B36...B45)	@COUNT(C36...C45)					
49	Average	@AVE(B36...B45)						
50	Variance		@SUM(C36...C45)/B48					
51	Standard Dev.		@SQRT(C50)					

Note: Column size was created for ease in reading the functions. Actual column size on your worksheet need not change from those defined last time.

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Similarly, we can enter the scores on each of the quizzes, tests and term paper values, automatically compute summary statistics and assign grades on the basis of percent mastered for any other test or quiz. The only change would be which column of data we would replicate and transfer to column B, rows 36 through 45. Indeed, we could compute @SUMmary score for each student and then follow the same basic steps, thereby assigning term grades. Take a few minutes and try these. I'll wait.... Now, save the worksheet.

Defining and Using the Curve

The use of the infamous curve is an alternative method for assigning grades. But, before you run to your computer and try it, read a little further. In order to effectively apply the curve, you must use the standard deviation value computed previously.

Let's see, if the grades are more or less normally distributed, then 68% of all the students should fall within one standard deviation from the mean. This middle 68% will earn a "C" grade. Additionally, approximately 95% of all the students will fall between -2 and +2 standard deviations from the mean, or 13% will earn a "B" and 13% will earn a "D." Anyone getting a score which is beyond -2 standard deviations away from the mean would fail the test while anyone getting a score which is more than +2 standard deviations away from the mean would earn an "A." Let's replace column F, rows 37 through 40 with formulae instead of absolute percents. (Cell F36 remains at zero.) In cell F37 enter the formula: +B49-(2*C51). This formula will serve as the basis for assigning a "1" or "D" grade. The beginning "2" or "C" grade can be computed by entering in cell F38 the formula: +B49-C51 . Similarly, the "3" or "B" grade can be computed with the formula: +B49+C51 , and the "4" or "A" range begins with the value from the formula: +B49+(2*C51). (Make sure that all your "(" are in the right place or you will not get the correct answer.)

Just press the ! key and watch the values. Try a set of quiz scores. Note, all you need to replace now are the values in column B, rows 36 through 45. Everything else will be computed for you, once you press the ! key, automatically.

Okay, now, before you look at Table 5., take a moment and re-execute the @SUM function you used for each student from column H, rows 6 through 15 to column B, rows 36 through 45. Enter the @LOOKUP function in column I, rows 6 through 15. Now, check the values listed in column I and determine what letter grades you would assign in column J. Check your results with those listed in Table 5.

If your results are different from mine, you probably have different student values in one or more cells. If not, you're doing fine.

A Post Script or: What To Do About Missing Values?

In making any of these computations, you will have to be careful that your program does not treat a blank as a value of zero. THE Spreadsheet functions will automatically skip all blank cells. When using a formula without a function, however, the cell will be treated as a zero, typically yielding incorrect results. Make sure to check your computational table space (especially column B), blank out the necessary computed cells (especially column D), and then recalculate (!) the appropriate values.

TABLE 5. MASTER TEMPLATE: THE COMPLETED MODEL AND DATA

	A	B	C	D	E	F	G	H	I	J
1		FINAL GRADES FOR SOCIOLOGY OF EDUCATION								
2										
3	Student's Name	TST1	Qz#1	TST2	Qz#2	Final	TermPp	PTS	Grade	
4										
5										
6	Student # 1		10	6	11	7	68	85	187	2 C
7	Student # 2		15	8	14	7	90	85	219	3 B
8	Student # 3		11	8	11	8	74	70	182	1 D
9	Student # 4		17	8	11	8	92	70	206	2 C
10	Student # 5		8	8	9	8	62	80	175	1 D
11	Student # 6		12	7	11	8	85	80	203	2 C
12	Student # 7		12	8	9	7	78	75	189	2 C
13	Student # 8		17	8	11	6	82	75	199	2 C
14	Student # 9		13	8	9	7	84	75	196	2 C
15	Student #10		11	8	10	8	78	85	200	2 C
16										
17										
18	N.of items/pts.		20	10	15	10	100	100	255	
19	Low Score		8	6	9	6	62	70	175	
20	High Score		17	8	14	8	92	85	219	
21	Count		10	10	10	10	10	10	10	
22	Average		12.6	7.7	10.6	7.4	79.3	78	195.6	
23	Variance		7.84	.41	2.04	.44	79.61	31	146.8	
24	Standard Dev.		2.8	.6403	1.428	.6633	8.922	5.568	12.12	
25										
26										
27										
28										
29				Computational Space						
30										
31										
32										
33			Stud.	(Score-	PCT	Num		Look Up Table		
34	Student's Name		PTS	mean)^2	COR	Grade		PTS	Grade	
35										
36	Student # 1		187	73.96	73	2		0	0 F	
37	Student # 2		219	547.6	86	3		171.4	1 D	
38	Student # 3		182	185.0	71	1		183.5	2 C	
39	Student # 4		206	108.2	81	2		207.7	3 B	
40	Student # 5		175	424.4	69	1		219.8	4 A	
41	Student # 6		203	54.76	80	2				
42	Student # 7		189	43.56	74	2				
43	Student # 8		199	11.56	78	2				
44	Student # 9		196	.1600	77	2				
45	Student #10		200	19.36	78	2				
46										
47	Sum		1956	1468.						
48	Count		10							
49	Average		195.6							
50	Variance			146.8						
51	Standard Dev.			12.12						

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SPREADSHEETS IN THE CLASSROOM (Part Two)

Knowing means and standard deviations is a useful piece of information when you need to deal with missing values. While some educators wish students to take a make-up examination, I find that: (1) it is often impossible to make an additional examination with exactly the same degree of difficulty as the original, and (2) the student who missed the examination had additional time to master the material. His or her test score, therefore, is less comparable and "fair" to other students with whom he or she is competing.

Here is an another solution. Let's say Student #3, just for a change, missed the first quiz but took the second test. He scored 11 points on the Test 2. If we compute his relative position on this test, we can then estimate his score on the first quiz by using the formula:

(((D8-D22)/D24)*C24)+C22

This formula simply computes his relative position (in standard deviation units) away from the average test score:

(D8 - D22 / D24)
or **((11-10.6)/1.428)=.2801**

then assigns a relative score to quiz #1:

(((D8 - D22 / D24)*C24)
or **(((11-10.6)/1.428)*.6403)=.1793**

and then assigns a value added to the mean of quiz #1:

(((D8-D22/D24)*C24)+C22
or **(((11-10.6)/1.428)*.6403)+7.7**
= 7.879

Thus, by using this simple formula, the score assigned to those students who missed an earlier examination retain their relative position earned in a later examination. By simply substituting other columns or rows, you can fill in missing data quite easily. Pretty neat!

Conclusion

You can now use this template for classroom grade management. Next time we will explore using THE Spreadsheet for basic statistical analysis. Now, I have to go and assign grades to students.

Good luck in modifying the template to your needs.

education

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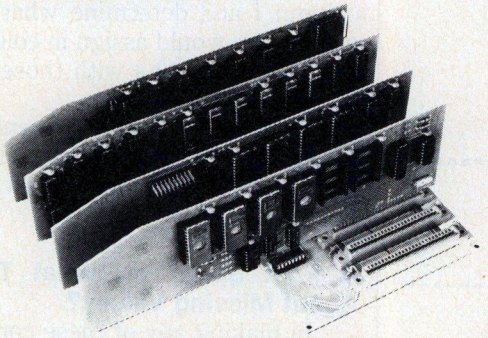

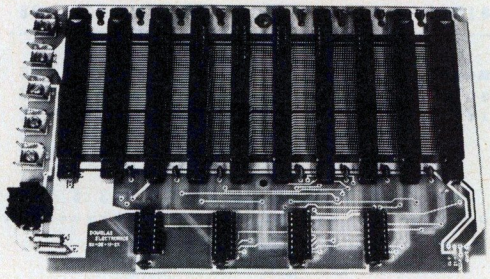

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Gary A. Leonard

REDUCE fractions to lowest terms and have your Apple give you its check of approval. Don't worry! If you are wrong it will show you the correct answer. Happy reducing!!

Program Sections

Line(s)	Description
20 - 140	character subroutine
150 - 160	wait/random seed subroutine
170	fraction data
180 - 190	machine language sound data
200 - 540	main body of program
550 - 570	correct answer subroutine
580 - 620	wrong answer subroutine
630 - 740	initialize and title routine
750 - 830	instruction routine
840 - 900	scoring routine

Variables

AA	3-D character color
CH	keyboard check
CK	reward plotting
D,DE,N,NU	denominator and numerator
DF	inputted denominator
F	random fraction data
L	transfer to subroutine
M	multiplier
NF	inputted numerator
P	machine language sound poke
RI	# right answers
RN	random seed variable
S,T	general purpose
SC	"x" plotting
WR#	wrong answers
X,Y	character position
DE$,NU$	denominator and numerator string
ST$	start string
TR$	transfer to subroutine string

```
]LIST

10  REM

THE BIG REDUCER : GARY LEONARD

 CALL -A.P.P.L.E. : OCT. 1983

15  GOTO 630
20  VLIN Y,Y + 8 AT X + 2: COLOR=
     AA: VLIN Y,Y + 8 AT X + 1: RETURN
30  VLIN Y,Y + 1 AT X: VLIN Y,Y +
     4 AT X + 3: VLIN Y + 4,Y + 8
     AT X: HLIN X,X + 3 AT Y: HLIN
     X,X + 3 AT Y + 4: HLIN X,X +
     3 AT Y + 8: COLOR= AA: VLIN
     Y,Y + 1 AT X - 1: VLIN Y + 1
     ,Y + 3 AT X + 2: VLIN Y + 4,
     Y + 8 AT X - 1: RETURN
40  VLIN Y,Y + 8 AT X + 3: HLIN X
     ,X + 3 AT Y: HLIN X,X + 3 AT
     Y + 4: HLIN X,X + 3 AT Y + 8
     : COLOR= AA: VLIN Y + 1,Y +
     3 AT X + 2: VLIN Y + 5,Y + 7
     AT X + 2: PLOT X - 1,Y: PLOT
     X - 1,Y + 4: PLOT X - 1,Y +
     8: RETURN
50  VLIN Y,Y + 4 AT X: VLIN Y,Y +
     8 AT X + 3: HLIN X,X + 3 AT
     Y + 4: COLOR= AA: VLIN Y,Y +
     4 AT X - 1: VLIN Y,Y + 3 AT
     X + 2: VLIN Y + 5,Y + 8 AT X
     + 2: RETURN
60  VLIN Y,Y + 4 AT X: VLIN Y + 4
     ,Y + 8 AT X + 3: HLIN X,X +
     3 AT Y: HLIN X,X + 3 AT Y +
     4: HLIN X,X + 3 AT Y + 8: COLOR=
     AA: VLIN Y,Y + 4 AT X - 1: VLIN
     Y + 5,Y + 7 AT X + 2: PLOT X
     - 1,Y + 8: RETURN
70  VLIN Y,Y + 8 AT X: VLIN Y + 5
     ,Y + 8 AT X + 3: HLIN X,X +
     3 AT Y + 5: HLIN X,X + 3 AT
     Y + 8: COLOR= AA: VLIN Y,Y +
     8 AT X - 1: VLIN Y + 6,Y + 7
     AT X + 2: RETURN
80  VLIN Y,Y + 8 AT X + 3: HLIN X
     ,X + 3 AT Y: COLOR= AA: VLIN
     Y + 1,Y + 8 AT X + 2: PLOT X
     - 1,Y: RETURN
90  VLIN Y,Y + 8 AT X: VLIN Y,Y +
     8 AT X + 3: HLIN X,X + 3 AT
     Y: HLIN X,X + 3 AT Y + 4: HLIN
     X,X + 3 AT Y + 8: COLOR= AA:
     VLIN Y,Y + 8 AT X - 1: VLIN
     Y + 1,Y + 3 AT X + 2: VLIN Y
     + 5,Y + 7 AT X + 2: RETURN

100  VLIN Y,Y + 3 AT X: VLIN Y,Y +
     8 AT X + 3: HLIN X,X + 3 AT
     Y: HLIN X,X + 3 AT Y + 3: COLOR=
     AA: VLIN Y,Y + 3 AT X - 1: VLIN
     Y + 1,Y + 2 AT X + 2: VLIN Y
     + 4,Y + 8 AT X + 2: RETURN

110  VLIN Y,Y + 8 AT X: VLIN Y,Y +
     8 AT X + 3: HLIN X,X + 3 AT
     Y: HLIN X,X + 3 AT Y + 8: COLOR=
     AA: VLIN Y,Y + 8 AT X - 1: VLIN
     Y + 1,Y + 7 AT X + 2: RETURN
```

education

THE BIG REDUCER

```
120  VLIN Y,Y + 1 AT X: VLIN Y +
     4,Y + 6 AT X: VLIN Y,Y + 4 AT
     X + 3: PLOT X,Y + 8: HLIN X,
     X + 3 AT Y: HLIN X,X + 3 AT
     Y + 4: COLOR= AA: VLIN Y,Y +
     1 AT X - 1: VLIN Y + 4,Y + 6
      AT X - 1: VLIN Y + 1,Y + 3 AT
     X + 2: PLOT X - 1,Y + 8: RETURN

130  HLIN X,X + 11 AT 20: COLOR=
     AA: PLOT X - 1,20: RETURN
140  HLIN 18,21 AT 18: HLIN 18,21
      AT 22: COLOR= AA: PLOT 17,1
     8: PLOT 17,22: RETURN
150  POKE  - 16368,0: POKE  - 163
     84,0: VTAB 24: PRINT "PRESS
     'R E T U R N ' TO CONTINUE..
     ";: INPUT ST$
160 RN =  RND ( -  PEEK (78) - 1)
     : HOME : RETURN
170  DATA  1,9,1,8,1,7,1,6,1,5,1,
     4,1,3,1,2,2,9,2,7,2,5,2,3,3,
     8,3,7,3,5,3,4,4,9,4,7,4,5,5,
     9,5,8,5,7,5,6,6,7,7,9,7,8,8,
     9
180  DATA  0,0,12,0,0,0,160,0,23
     8,0,3,238,1,3,174,2,3,173,48
     ,192,136,208,10,206,0,3,208,
     5,206,1,3,240,5,202,240,234,
     208,238,96,0,0
190  DATA  173,48,192,136,208,5
     ,206,46,3,240,9,202,208,245,
     174,45,3,76,47,3,96,0,0
200 F =  INT ( RND (1) * 27) + 1
210  FOR T = 1 TO F: READ N,D: NEXT
     T: RESTORE
220 M =  INT ( RND (1) * 8) + 2
230 NU = M * N:DE = M * D:NU$ =  STR$
     (NU):DE$ =  STR$ (DE)
240 TR$ = NU$:Y = 8: ON  LEN (TR$
     ) GOSUB 270,280
250 TR$ = DE$:Y = 24: ON  LEN (TR
     $) GOSUB 270,280
260 X = 2: COLOR= 1: GOSUB 130: COLOR=
     1: GOSUB 140: GOTO 340
270 X = 6:L =  VAL (TR$): GOSUB 3
     10: RETURN
280 X = 3:L =  VAL ( LEFT$ (TR$,1
     )): GOSUB 310
290 X = 9:L =  VAL ( RIGHT$ (TR$,
     1)): IF L = 1 THEN X = 8
300  GOSUB 310: RETURN
310  COLOR= 1
320  ON L GOSUB 20,30,40,50,60,70
     ,80,90,100: IF L = 0 THEN  GOSUB
     110
330  RETURN
340  COLOR= 1:X = 26: GOSUB 130
350 X = 31:Y = 8: POKE  - 16368,0
     : POKE  - 16384,0
360  COLOR= 1: GOSUB 120
370 CH =  PEEK ( - 16384) - 128: IF
     CH ) 48 AND CH ( 58 THEN  POKE
      - 16368,0: COLOR= 0:AA = 0:
      GOSUB 120:: AA = 13:X = 30:N
     F = CH - 48:L = NF: GOSUB 31
     0: GOTO 400
380  COLOR= 9: GOSUB 120
390  GOTO 360
400  POKE  - 16368,0: POKE  - 163
     84,0
410 Y = 24
420  COLOR= 1: GOSUB 120
430 CH =  PEEK ( - 16384) - 128: IF
     CH ) 48 AND CH ( 58 THEN  POKE
      - 16368,0: COLOR= 0:AA = 0:
      GOSUB 120:AA = 13:X = 30::D
     F = CH - 48:L = DF: GOSUB 31
     0: GOTO 470
440  IF CH = 8 THEN  COLOR= 0:AA =
     0: GOSUB 120:X = 30:Y = 8:L =
     NF: GOSUB 320:AA = 13: GOTO
     340
450  COLOR= 9: GOSUB 120
460  GOTO 410
470  POKE  - 16368,0: POKE  - 163
     84,0
480 CH =  PEEK ( - 16384) - 128: IF
     CH = 8 THEN  COLOR= 0:AA = 0
     :L = DF: GOSUB 320:AA = 13: GOTO
     400
490  IF CH = 13 THEN 510
500  GOTO 480
510  IF N = NF AND D = DF THEN RI
      = RI + 1: GOSUB 550: GOTO 5
     30
520 WR = WR + 1: GOSUB 580: GOTO
     530
530  IF WR + RI ) 9 THEN 840
540  GR : GOTO 200
550  COLOR= 12: FOR CK = 15 TO 20
     : PLOT CK,CK + 10: POKE 813,
     20: POKE 814,20: CALL 815: NEXT

560  FOR CK = 20 TO 36: PLOT CK,5
     0 - CK: POKE 813,10: POKE 81
     4,10: CALL 815: NEXT
570  FOR T = 1 TO 700: NEXT : RETURN

580  COLOR= 9: FOR SC = 26 TO 37:
      PLOT SC,SC - 11: CALL 774: PLOT
     SC,52 - SC: CALL 774: NEXT
590  FOR T = 1 TO 700: NEXT : COLOR=
     0: FOR SC = 26 TO 37: PLOT S
     C,SC - 11: PLOT SC,52 - SC: NEXT

600 AA = 0:X = 30:Y = 8:L = NF: GOSUB
     320:Y = 24:L = DF: GOSUB 320
610  COLOR= 1:AA = 13:X = 26: GOSUB
     130:Y = 8:X = 30:L = N: GOSUB
     310:Y = 24:L = D: GOSUB 310
620  GOSUB 150: RETURN
630  TEXT : HOME
640  FOR T = 1 TO 27: READ N,D: NEXT
     : FOR S = 768 TO 808: READ P
     : POKE S,P: NEXT : FOR S = 8
     15 TO 837: READ P: POKE S,P:
      NEXT : RESTORE
650  HTAB 12: VTAB 12: PRINT "F R
      A C T I O N S"
660  FOR S = 15 TO 1 STEP  - 1
670  HTAB 12: VTAB 10: PRINT "R E
     " SPC( S)"D U C I N G
680  FOR T = 1 TO 200: NEXT : CALL
     774: NEXT
690  FOR S = 24 TO 14 STEP  - 1: VTAB
     S: PRINT  TAB( 16)"BY" SPC(
     40): NEXT
700  VTAB 14: FOR S = 19 TO 1 STEP
      - 1: CALL 774: HTAB 17 + S:
      PRINT "BY  ";: NEXT
```

education

```
710  FOR T = 1 TO 200: NEXT : PRINT

720  PRINT : FOR S = 1 TO 10: VTAB
     18: PRINT " " SPC( S)"GARY E
     . LEONARD": FOR T = 1 TO 10:
      CALL 774: NEXT : NEXT
730  INVERSE : VTAB 23: FOR T = 1
      TO 40: PRINT " ";: NEXT
740  FOR T = 1 TO 20: PRINT : CALL
     774: FOR S = 1 TO 200: NEXT
     : NEXT
750  NORMAL : VTAB 3: PRINT "****
     ********* INSTRUCTIONS *****
     *********"
760  PRINT : PRINT : PRINT "  YOU
      ARE TO REDUCE 10 FRACTIONS
     TO"
770  PRINT : PRINT "LOWEST TERMS
     WITH A SINGLE DIGIT NUMERA-"

780  PRINT "TOR AND A SINGLE DIGI
     T DENOMINATOR. IF "
790  PRINT : PRINT "YOU WISH TO C
     HANGE YOUR ANSWER USE THE"
800  PRINT : PRINT "LEFT ARROW KE
     Y. PRESS 'RETURN' WHEN YOU"
810  PRINT : PRINT "HAVE THE ANSW
     ER YOU WANT. IF YOU ARE"
820  PRINT : PRINT "WRONG THE COR
     RECT ANSWER WILL BE GIVEN."
830  GOSUB 150: GR :WR = 0:RI = 0
     :AA = 13: GOTO 200
840  TEXT : HOME : VTAB 10: HTAB
     10: FLASH : PRINT " " SPC( 1
     8)" "
850  FOR S = 11 TO 13
860  VTAB S: HTAB 10: PRINT " ";:
      NORMAL : PRINT  TAB( 29);: FLASH
     : PRINT " "
870  NEXT
880  VTAB 14: HTAB 10: FLASH : PRINT
     " " SPC( 18)" "
890  VTAB 12: HTAB 12: PRINT "S C
      O R E = " INT (RI * 10)" %"

900  NORMAL : GOTO 830
```

education

```
]LIST

5  REM

 SO WHAT DID YOU EXPECT DEPT.

P F STEELE : CALL -A.P.P.L.E.

10 A$ = "FC58G 300:A2 00 A9 00 85
       25 A9 19 85 20 A0 00 B9 25
      03 C8 20 ED FD C0 10 D0 F5 E
      8 E0 14 D0 EE A9 16 85 25 A9
       00 85 20 60 8D C3 C1 CC CC
      AD C1 AE D0 AE D0 AE CC AE C
      5 AE 300L 300G N D9C6G"
20   FOR I = 1 TO  LEN (A$): POKE
      511 + I, ASC ( MID$ (A$,I,1)
      ) + 128: NEXT : POKE 72,0: CALL
      - 144
30   VTAB 21: HTAB 1: PRINT "SO WH
      AT DID YOU EXPECT?"
```


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PRE-SCHOOL ALPHABET

Garry Margolis

THE parent of a pre-school child wishing to introduce his or her offspring to the marvelous world of the computer has a plethora of choices available today. *Call -A.P.P.L.E.* readers most likely have already selected their hardware, so this survey will review four Apple programs which teach the alphabet. Future reviews will evaluate other pre-school software.

The prime tester in this household is now 5½ years old, male, and bright. His first exposure to a computer was shortly before his third birthday, when an Apple][+ appeared on the dining room table. He was fascinated by the demonstration programs on the System Master, and I rapidly realized that my toy could be a powerful educational tool. But what about software?

It is hard to believe today, but in early 1981, it was virtually impossible to find suitable software for pre-readers, aside from a good cartridge for the TI-99/4, an otherwise useless machine which was then selling for over $1,000 (also hard to believe!). I managed to locate a short program by Jay P. Lucas (Creative Computing - March, 1980, pp. 136-7) and had to learn enough Applesoft Basic to translate it into useable form.

This program used "no-res" asterisks to sequentially draw large alphabet letters on the screen — when the child pressed the matching key, the computer issued a series of congratulatory [Ctrl-G] beeps, scrolled the letter off the screen and wrote the next letter. There was no negative reinforcement — a wrong keypress simply did nothing.

Within two months, our resident tester had not only learned the alphabet, he had also learned the computer keyboard and could go through all 26 letters with virtually no false moves. There was no color, no fancy animation and no music — all this was irrelevant to him at that time, at least partially because he had not been exposed to more sophisticated programs.

Several months later, Fred Huntington of Huntington Software, a father who is at least as proud of his offspring as I am of mine, introduced me to the first decent piece of commercial pre-school software for the Apple:

Hodge-Podge *$18.95*
Published by Dynacomp, Inc.
1427 Monroe Avenue
Rochester, NY 14618
Copyable and modifiable

Hodge-Podge has simple Low-Res graphics which are, for the most part, legible on a monochrome screen, reasonably well thought out but mistuned music and some excellent ideas as well as some annoying but reparable flaws.

After the program boots, the ABC song plays under the main title, followed by a prompt to press any key. When the child presses a key, an animated Low-Res image appropriate to that letter appears accompanied by appropriate music or sound effects. For instance, when "F" is pressed, a barn appears, "Old MacDonald Had a Farm" plays, and at the appropriate point, one of several random animals appears. When "E" is pressed, an empty glass appears and is then filled, and the words "EMPTY" and "FULL" are printed in the text window.

The best parts of the program design are the mathematical concepts which are introduced: pressing "<" (SHIFT-,) or "," presents an animal image, followed by a large "<" and then by a larger animal; the converse happens if the ">" or "." is pressed. This is a clever and effective way of introducing size relationships and their symbolic representations. Pressing the "+" (SHIFT-;) or ";" puts a simple symbolic addition problem on the screen. A "=" (SHIFT -) or a "-" puts two groups of vertical bars on the screen with either a large "=" or a large "#" between them, depending on the number of bars on each side.

Hodge-Podge also presents some useful musical concepts, if one can ignore the intonation problems. Pressing a numeral key puts a music staff on the screen and plays individual notes (1-8), a one octave scale (9), or turns the numeral row into a "piano" keyboard (0). Shifted numeral keys (1-9) print the name of the number.

The program was originally written in Integer Basic and was translated into Applesoft by someone other than the original program author — both versions are supplied on the program disk. The Integer version runs fairly well; the translation, however, is not very good — delay loops are poorly timed, musical rhythms need some adjustment, and one GOSUB without a matching RETURN causes the program to bomb if certain letters are pressed repeatedly. A.P.P.L.E.'s *The Converter][* on the Applesoft Carpenter disk could probably do a better job than this translation. Additionally, if the child presses "ESC" or "CTRL-C," the program ends, and there is a lot of dead, unreferenced code.

Fortunately, the program is modifiable, so that most of these problems could be repaired.

—◉→

education

While I was at it, I substituted my son's name in the title, fixed an inaccurate graphic, corrected a misspelling or two and changed the input routine to be much more responsive than the original.

I documented the changes in a letter to Dynacomp, but received no response, so I do not know if current copies have been revised. Owners of Hodge-Podge can receive a copy of my changes (*not* the program, which is copyrighted) by sending me a #10 size self-addressed, stamped envelope.

After revision, this program held my tester's interest for about six months, which is a good lifespan for a program of this type. With revisions, Hodge-Podge is recommended because of its unique and valuable presentation of mathematical concepts.

More recently, some programs have appeared which have beautifully executed High-Res graphics and are much more elegantly put together although more expensive than their predecessors.

Stickybear A-B-C *$39.95*
Xerox Education Publications
Middletown, CT 06457
Copy protected
backup free, 1st 90 days
$10 thereafter

Stickybear A-B-C is part of a series of four related programs which have charming and superbly animated drawings by Richard Hefter. Two different animated images are presented for each letter, accompanied by cute, but sometimes bothersome sound effects and music. For example, pressing "Z" puts a small walking zebra on the screen; pressing "Z" again shows a zipper which is moving up and down. The animation is the smoothest and cleanest I have ever seen on the Apple, and the graphics are very legible on a monochrome monitor. Pressing a "wrong" (non-alphabet) key gets an audio response but does not cause the program to end or crash; RESET reboots the program. It would have been preferable to modify the RESET vector to continue the program. The sound, regrettably, cannot be muted, and some of the shorter repetitive sound effects can quickly raise the hackles of adults in earshot.

The program package also includes a storybook which is related to the graphics on the disk, a poster, and (best of all, as far as children are concerned) some stickers to attach to various objects around the house.

Unfortunately, there are no numerals included in this package — in order to present numerals, one must purchase the complementary program, Stickybear 1-2-3, for another $39.95. For the extra $40, one also gets another book, poster, and set of stickers. While Stickybear 1-2-3 is an interesting program, the cost of the pair is considerably higher than another excellent program, to be discussed below.

Our tester, who knows his alphabet very well by now, was diverted by the images but was not particularly interested in repeat viewings.

Finally, we look at our tester's preferred program:

Alphabet Beasts & Company *$29.95*
Software Productions
P. O. Box 21341
Columbus, OH 43221
Not protected

Alphabet Beasts & Co. has excellent High-Res graphics which are quite good on a monochrome screen. Single images of various dragons, spaceships, and other mythical figures such as (for "T') a thunderbird totem, along with images of boys and girls are presented, each with a four-line verse intended to be read to a pre-reading child. The novel approach in this program is that the Zaner-Bloser alphabet model letters, which are most commonly taught as the standard block printing capitals, are traced on the screen if the selected letter is pressed a second time.

Numerals are included — an initial keypress traces out the Zaner-Bloser letters which spell out the selected number. A second keypress traces that numeral, then a fire-breathing dragon flies in and reveals another dragon twisted into the shape of that numeral, after which the corresponding number of dragons appear on the side of the screen.

Still another feature allows the child to mix and match heads, bodies and legs of several different human and monster characters — when the child is satisfied, the character is put into an incongruous background drawing.

Alphabet Beasts & Co. is copyable but not modifiable. There is an arrow on the diskette label to assist a child in properly orienting the diskette when inserting it into the drive. The music played in this program is reasonably in tune, and "wrong" key presses get no response — it is not possible to accidentally exit the program.

Our resident tester is quite taken with this program, as am I. He particularly enjoys the numeral writing and flying dragon sequences, but is not very interested in the mix and match feature, perhaps because he has Facemaker, a much more sophisticated and humorous program to be reviewed in a future survey.

The four programs covered here each have advantages. The Lucas program forces the child to respond to alphabet letters in sequence by searching out those letters on the keyboard. A parent can, of course, do this with any of the programs, but its price is hard to beat. Hodge-Podge , assuming it has been revised, effectively teaches mathematical concepts in an original manner, and is a good value. Stickybear A-B-C is beautifully executed but contains no numerals, and has some grating sounds. Alphabet Beasts & Co. demonstrates how to print letters and numerals in an interesting style.

The Apple II is a remarkably rugged machine which has stood up to the onslaughts of our moderately careful tester without difficulty. Parents of pre-school children who do not give them access to some of the excellent software now readily available will be denying them a remarkable growth opportunity.

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A Call —A.P.P.L.E. SOFTWARE REVIEW:

HEALTH AIDE

Richard Wahl, M.D./reviewer

HEALTH-AIDE *$79.95*
Knossos, Inc.
422 Redwood Avenue
Corte Madera, CA 94925
Not copy protected

SO you've always wished you had a cousin who was a nutritionist who would help you plan an exercise and diet program that would help you lose 20 pounds effortlessly in two months. Who would help you keep track of all that cholesterol that you're eating and shouldn't be (or the fiber that you're not eating and should be). Who would help you figure out how much protein your five year old is sneaking in between chocolate bars. Who would tell you how to change your diet now that you're pregnant and will soon be breast-feeding. And, of course, who would prepare shopping lists for you, draw high-resolution graphs to show your progress (or lack of it), and who would never laugh at you behind your back. Knossos, Inc. feels they have just the answer for you.

HEALTH-AIDE is a complete nutrition/health package designed to do most of what a nutritionist might help you do. The 15 programs supplied on the four non-copy protected sides of two disks, along with a 175 page loose-leaf notebook text, seem to be able to provide all that is promised. The package is not a nutrition course, although a 13 page chapter and several appendicies attempt to provide an overview of nutrition theory. Rather HEALTH-AIDE is a valuable utility for someone who already has a good background in nutrition. Its price ($79.95) permits home use, but it will probably prove most beneficial to health and education professionals. Knossos believes purchases to be evenly split between home and professional users.

The package is based on current standard nutritional practice, using dietary diaries (with all foods encoded in six letter code words such as ORAN-J for orange juice), and based on substitution (exchange) groups used by everyone from the Department of Agriculture to Weight Watchers International.

One begins the journey through HEALTH-AIDE with the NEEDS program which calculates for you your Recommended Daily Allowance for each of HEALTH-AIDE's 33 stored nutrients. First your initials are entered, along with your name, which serves as your identifying code for all HEALTH-AIDE Programs. Space for sex, age, and whether pregnant or nursing are then filled in (these latter two are not requested for males). For the "calories" field, three options are presented: one can enter in a specific value (or goal), one can leave the field blank and have the program compare your actual caloric intake to your daily caloric expenditure, or a "D" can be entered which will take you to a Diet Guide subprogram. The Diet Guide will recommend a daily caloric goal based on present and desired weights, and how gradually you want to lose weight.

The next step is the EATS program, in which you enter what you've eaten for each of three meals and a snack (the total of all in between meal consumption). As items are entered, a running tally is kept on any four nutrients, such as calories, carbohydrate, protein, and fiber. The protein quality is then analyzed in terms of amino acid balance. Next, a full meal analysis is given for each of the 33 nutrients, giving both their actual consumption and as a percentage of your individual Recommended Daily Allowance. Finally, summaries for the day are given, both as bar graphs showing intake as compared with the R.D.A., and as a summary table. Most screens can be printed by entering [Ctrl-P] as the program runs.

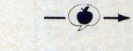
The Monthly disk is inserted at the end of the day's entry, so the summary data can be stored in your monthly file. Summary data for months or years can be listed in table format or as high-resolution graphs, which can be printed.

Another use of the EAT program is to analyze meals ahead of time in preparing a planned diet. The stored menus can be used as a starting point, with substitutions within food exchange groups easily made. In addition, markers can be added to the listings which will identify which items should be added to a shopping list.

If you are not satisfied with the 770 foods supplied with the program, new foods can be entered. Separate foods can be combined into one item to save time. For example, two tablespoons of peanut butter (PB), one tablespoon of jelly (JELLY), and two slices of cracked wheat bread (BR-CW), can be combined into a new food, peanut butter and jelly sandwich (PBJ).

The EXERCISE program can be used to examine energy expenditure, and can calculate how many calories 30 minutes of running burn up, or how many minutes of typing is required to "equalize" the calories consumed in a study break.

HEALTH-AIDE does work, and does deliver all that it promises. Its completeness can be a drawback, as it requires several hours to master and 20-30 minutes each evening typing in data. I found it fascinating at first, but then lost interest, feeling that my time was better spent swimming (0.117 cal/kg/min) rather than sitting at my Apple (0.017 cal/kg/min). HEALTH-AIDE would be most useful as a diagnostic aid for an office or hospital based nutritionist, or as part of an exercise and nutrition program offered by a health club. Another good application for HEALTH-AIDE would be as part of a nutrition course in a high school or college, where the implications of a given diet or activity could easily be illustrated. Still, if an individual has the motivation and time (both needed in large quantities), HEALTH-AIDE could be very useful in the home.



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HEALTH AIDE

One feature (asset/debit?) which I found curious was the one-character type-ahead buffer used in the program. The first character of a reply can be entered in as the computer is in operation, but complete screens can be skipped over completely by an extra "carriage return," sometimes requiring that the program be started over. Another feature which was cumbersome is the inability to change data base disks while entering data. The primary data base disk does contain 700 listings, though the usefulness of some listings I don't quite understand (such as 26 different nutritionally unimportant spices, and raw vs. cooked dandelion greens). The Extra Foods disk contains many "fast-food" items which, given the current American diet, are very useful to have listed. In addition, KNOSSOS promised to have more data base disks available in the future. It would prove very convenient if disks could be switched while entering food diaries rather than having to move all used foods to the primary disk ahead of time.

The documentation is a major asset to the package. It is professionally presented and served as an excellent tutorial to the program, providing instructions on how to "dive-in" to the program before fully understanding all of its features, as well as detailed chapters on each of its sub-programs. The chapter on nutritional theory was brief, but the package is not intended to be used as a nutrition text-book.

All in all, I did find HEALTH-AIDE a quality nutrition utility which could successfully be used by both professional and home users.

Hardware Required

Apple II with Applesoft Basic, 48K RAM Memory (or Apple /// with emulator).

One disk drive (2 supported), DOS 3.3.

Printer supported (and useful).

Knossos' comments to the review follow:

We have added several features since HEALTH-AIDE was reviewed:

1) *You may now select what activites you wish to use from a list of 150 activites.*
2) *All food amounts may be shown in either common household units or in grams.*
3) *We have added polyunsaturated fat as a nutrient.*
4) *All programs now run faster and have faster disk access.*
5) *We have added the capability to replace the food database disk in the middle of your food analysis. This will allow you to use as many food disks as desired without having to transfer foods from one disk to another.*
6) *Each nutrient analysis is marked if one or more of the foods did not have a value for that nutrient.*

Dr. Wahl's review is correct in its content. His two major complaints have already been corrected. The spices have been moved to the extra database while some fast foods have been used to replace them. Also, the comment about switching disks has been answered by item 5 discussed above. The comment about the carriage return causing you to skip screens was carefully noted in the documentation. I think his time estimate on how long it would take to use the program each day is overstated, especially if one uses menus and combined foods to simplify food entry.

Thank you for your time and effort in evaluating this package. We have received very favorable response, selling many programs to schools, hospitals and even the Stanford Heart Disease program.

reviews

A Call -A.P.P.L.E. SOFTWARE REVIEW:

THE PRINTOGRAPHER

Roger Lilly/reviewer

Printographer *$49.95*
Southwestern Data Systems
10761-E Woodside Avenue
Santee, CA 92071
Protected
Included copy program allows three backups.

Introduction

THE PRINTOGRAPHER is a High-Res graphics printing utility from Southwestern Data Systems (S.D.S.). The Printographer package contains a number of nifty features that make the program a real winner. Besides the usual ability to do a menu dump of either High-Res screen, the program can print to the disk for subsequent printing or even spooling (with DOUBLETIME PRINTER from S.D.S.). Even more important, from my viewpoint, is that the Printographer generates files that may be included in user written programs to do High-Res screen dumps, saves or loads. The saves and loads can be from special compressed files (more about that later).

Initial Setup

The Printographer interfaces to an amazing number of printer makes and models and printer interface cards. The number of printers is presently greater than 25 and more than 15 different interface cards. The Printographer also supports daisy wheel printers. Of course I have not tested these claims except for my printer and interface (Epson MX-80 and Epson parallel card), but I expect that other printers will interface to the Printographer as easily as the Epson.

Because of the Printographer's ability to interface to so many printers and interface boards, one might suspect that setting up the Printographer for use with a particular printer might be difficult. It is, however, very simple. Upon initial boot up (after backing up your disk using the special backup program that allows for three backups), the configuration program automatically runs. You are presented a list of printer makes and models and asked to input your type. The same is done for interface card and slot number. Provision is made for printers and interfaces not on the list. The documentation even discusses writing your own printer driver interface! After you answer the questions, the configuration program then generates the required files to use with your setup. You are then left in the CROP program.

Stand Alone High-Res Dump

The CROP program is the Printographer stand alone menu dump program. This program allows the printing of either High-Res screen, saving of either screen in normal or compressed mode to a disk file, and the ability to crop a High-Res image. Screens may be saved in their cropped form. The compressed mode can make a dramatic difference in file space used. For example, graphical displays (in which I'm particularly interested) can be saved in less than half the usual 33 or 34 sectors. Before printing, you are given the choice of magnification, indentation and inking (black on white or white on black). On my Epson, a magnification of three was the maximum possible for a full screen dump (this produced a printout of about 8 inches wide and 5.4 inches high). Magnifications of up to 9 may be used by suitably cropping the picture. Three cropping modes are possible. A normal rectangular crop (top and bottom and left and right side) and a cameo (ellipse) crop and a diamond crop. The rectangular crop can be combined with the latter two types. These two types of crops should appeal to "artsy" types. All commands in the CROP program work as advertised and the user is allowed to backout to the main command level at any time.

If the user presses the "D" key immediately after BRUNing the CROP program, a screen dump will be sent to the disk instead of the printer. This file can subsequently be printed without reloading the image into memory. However, considerably more disk space is used and the printing time is increased by a factor of about two for the image and magnification that I used.

Interface to User Programs

The configuration program generates binary files that can be linked to Applesoft or Integer programs which will allow user written programs to do anything that the CROP program can do with the exception of the cameo and diamond crop. For example, a call to print a cropped image on High-Res page 1 would be

```
CALL 35456,HGR,N,H,MAG,MRG,
BR,ER,BC,EC

HGR : High-Res page 1
N   : Black on white background.
H   : Horizontal print format.
MAG : Magnification value. 1..127.
MRG : Number of dots of
      indentation
BR  : Beginning row number
      of dump.
ER  : Ending row number
      of dump.
BC  : Beginning column number
      of dump
EC  : Ending column number
      of dump
```

The Printographer comes with sample programs demonstrating the use of the various routines. This is definitely the right way to do things. The documentation has a total of six pages devoted to using the routines from within user written programs.

Recommendations for Program Improvements

Lest you think that I am writing advertising copy instead of a review, let me point out some areas where there could be some improvement.

—◉→

reviews

THE PRINTOGRAPHER

First of all, the dump routine is very slow on a large magnification, full screen dump. It takes the Printographer a full 10 minutes to do a magnification 3 dump on my Epson. This compares poorly to the 3.5 minutes taken by AMPERGRAPH (by Madwest Software) for the same size printout. It would also be nice to have independent control over the vertical and horizontal magnifications. A more serious deficiency is the inability to pass the parameters defining which screen to dump, what format to use, and which inking to use, as string variables. The other parameters can be passed as numeric variables. Another serious problem is that the routines which save and load compressed files use High-Res page 2 as a work space. In fact, the save routine uses "all of Page 2, plus some" (a little better documentation please). This is a lot of memory to give up as well as limiting saving or loading compressed images to or from High-Res page 1. Another problem is the lack of information on page 0 usage of the machine code. I found it necessary to save all page zero locations used by my plotting program since I did not know which locations were being used by the Printographer programs. Another minor problem seems to exist upon exit from the print from disk routine, as often a "formula too complex" error message would be printed upon the execution of anything but an END statement.

User Support

I had two problems with the Printographer about which I contacted S.D.S. The first concerned the lack of response of the CROP program to one of its commands. The response from S.D.S. was very gratifying. They immediately explained that there had been a problem created by the addition of more printer drivers and that the problem had been fixed. They put another Printographer disk in the mail which I received the next day. They did not even request return of the original disk. When I had some trouble understanding the documentation concerning the print to disk routine, I again contact S.D.S. They mailed to me by priority mail a preliminary copy of their updated manual for the Printographer. Again I received it the next day. This is truly customer support.

Summary

This is a very good product that does what it says it will do. Although I have some minor complaints I can certainly recommend it to someone needing a High-Res dump program. The ability to use the routines from within your own program is a real plus and the support from S.D.S. is outstanding.

Note: The new version of Printographer supports color printers.

reviews

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READ**	42.2 sec.	12.4 sec.
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APPEND**	21.3 sec.	2.3 sec.

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A **Call -A.P.P.L.E.** PRODUCT REVIEW:

THE TRS CONNECTION

Art Ude/reviewer

THE Audacity of it! The Presumptive Nerve! The Disrespect, Gall, and Outright Indignation! To submit a TRS-80 review to *Call -A.P.P.L.E.* What is worse, they actually publish it! This deserves nothing less than an irate letter to the editor and a cancellation of your membership. But wait — before you toss this issue in the bit bucket, hear me out. I am as much a dedicated Apple owner as you are, and until a few weeks ago the last thing in my mind would have been to review a Trash 80, much less buy one — but then I saw the new Model 100. If you are a confirmed Apple devotee and "disdain" Radio Shack machines then please, don't even glance at the TRS-80 Model 100; lest temptation be too great, and you, as I did, fall victim to its whims and wiles.

The 100 will provide you with one thing that your Apple lacks: Portability. For "portable," the 100 truly is. Notebook size, measuring 11 5/8" by 8 1/4" and 2 inches thick, it weighs slightly less than 4 pounds, yet features a full ASCII keyboard. It fits naturally on your lap, which I have found to be the most comfortable typing position. The LCD screen shows eight lines with 40 characters per line, upper and lower case, an assortment of graphic symbols and foreign language characters, and the display is adjustable for easy viewing.

The 100 runs on four AA batteries and retains all that is in its memory when turned off. This is due to a rechargeable Ni-Cad battery that is automatically recharged when the machine is on, or when connected to an optional ($5.95) AC adapter. It comes with 8K of RAM at $799 or 24K at $999, and can be upgraded in increments of 8K at Radio Shack stores for $119 to a total of 32K. I would recommend the 24K version. Included in the price is a soft vinyl case, a 224 page owners manual and a brief reference guide.

The manual is good, easily understood by the novice, contains an index and some technical information, but is far from being a complete source book on the 100. Tandy promises more information by the time you read this. What is not supplied, but needed, are cables of various descriptions. You will want the modem cable, the RS-232 cable, and perhaps the parallel printer cable, the cassette recorder cable, the acoustic coupler or the bar code reader. Just mentioning all of these provides you with a glimpse of the 100's built-in capabilities. Each of these cables and extras will set you back $19.98 or more.

There is also a large carrying case that holds the computer and cassette recorder with room left for "extras," but I prefer just to stuff the machine in my carry-on suit case. As you can see, the 100 is not an investment to be made lightly. So, for the Apple owner, is it worth it?

I travel a lot. I do it for a living. My Apples stay at home and await my return. Now, with the 100, time spent waiting at airports or sitting in hotel rooms can be used writing, programming or communicating. When I return to the Apples, all 100 files are transferred to the Apple disks for storage. The 100 has a cassette port, but why use tape when disks are available?

Transferring files between the Model 100 and the Apple takes little effort and two short programs. The 100 has a built in modem, capable of 75 to 19200 baud and a built in telecommunications program. Set the Model 100 to 300 baud to match the Hayes Micromodem II (Stat: M7I1E is fine). The optional modem cable modular plug on the beige cord, (part #26-1410) inserts directly into the Hayes coupler. No need to go through telephone lines. Set the ANS-ORIG switch on the 100 to ANS. Now activate the Micromodem II in the Apple with an IN#2 Return, PR#2 Return (assuming slot 2 for the modem), [Ctrl-A], [Ctrl-F], [Ctrl-A], [Ctrl-Q]. The Apple screen will display MICROMODEM II: DIALING:. Now enter the Telcom program on the 100. Select option 4, Term, and then hit the Return key on the Apple. The 100 will emit a short tone and your computers will be linked together. If the 100 is in half duplex, type function key 4 to switch to full duplex.

I found it best at this point to issue a [Ctrl-R], Return, from the 100's keyboard. You have entered BASIC on the Apple and have complete control of your Apple from the 100. You will find that you are not getting line feeds on the 100. To cure this problem type POKE 1912+2,18; again assuming 2 is the slot in which your MicroModem resides. The Apple's keyboard is still active and you can use either keyboard for control. Notice, however, that you do not have lower case but you can type the left bracket. A [Ctrl-Y] will enter the monitor and 3D0G will return you to BASIC. If you should type a [Ctrl-S] from either keyboard, the "Wait" flag will appear by the function key F6 and you will have to issue a [Ctrl-Q] from the Apple to clear it. A [Ctrl-T] from the 100 will return you to the terminal mode.

There are several ways to upload files from the 100 to the Apple using the 100's Telcom program. I have found that saving the files on the Apple disk as binary files, using the following program, is fast and avoids any missed characters. Enter the short BASIC program in listing #1 on your Apple. If your Hayes modem is in slot #3, change the Line 200 DATA statement. The second number, 194, should be a 195 for a slot 3 modem. When you want to upload from the 100 run the program. When it asks "Begin Upload" type function key 3 on the 100 and enter the name of the DO text file. After typing "132" to the "Width?" question, the "Up" flag will appear and the file will upload.

You can watch the output on the Apple's screen. When the transfer is complete, the "Up" flag will go off.

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reviews

THE TRS CONNECTION

Now type [Ctrl-E] on the 100 to signal the Apple that the upload has ended, and the file will be saved to disk. You may use this program within any other communication program that you have, but set HIMEM to 24575 in line 1 to avoid conflicts.

To download from Apple to the 100, use the program in listing #2. It will read the Apple's binary file and, after you type function key 2 on the 100, read the file on the Apple disk and send it to the Model 100. This file should end with the reverse backslash character (ASCII 220). You could change this to any character you wish by putting a different number in line 110 of listing #2. A reverse backslash can be typed from the 100 by using the graph key and minus key.

If you are using one of the several communication software programs available for the Apple, you probably can use the features within these programs to transfer your files. Depending on the program, however, you may or may not be able to activate the program with the cable from the 100 connected directly to the coupler. You may have to go through a telephone line.

If you are traveling with the 100 and want to access your Apple, you will need some type of a "pickup" program. I strongly recommend "The Answering Machine" program from Ed Magnin's Telephone Software Connection in Torrance, California (modem 213-516-9432). The program is written in BASIC, easy to modify, provides security from others dialing into your Apple, and costs only $35. The programs listed above can be merged (after some line renumbering) with "The Answering Machine" to provide upload and download capabilities.

"But," you ask, "didn't you mention an RS-232 interface? Why not use that?" Why not, indeed! If you have a serial card plugged into your Apple, simply connect the two machines directly with the Radio Shack 26-1408 cable. Consult your serial card manual for the correct configuration. If you are using the Apple Super Serial Card position the jumper block toward "Modem" and place the switches as follows: Switch 1; OFF, OFF, OFF, ON, ON, ON, ON. Switch 2; ON, OFF, OFF, ON, ON, OFF, OFF. The Model 100 Stat should be changed to 87N1E. Now do a IN#1 and PR#1 (serial card in slot #1) on the Apple, enter the Telcom program on the 100, press function switch 4, and, walla, you're connected. To download to the 100, LIST a BASIC program, dump a text line, or use program #2 to read a binary file. To upload from the 100 use program #1, but note the REM line 205 and make the DATA statement changes as necessary.

If telecommunicating or writing are necessary to you, then the advantages of the portable Model 100 are obvious. But what about BASIC programming? It is not an Apple and does not use Applesoft. Is programming on the 100 worth the effort if the programs are to be run on an Apple? The Model 100 uses a version of Microsoft BASIC written especially for that machine. It is excellent and very powerful. Besides the normal BASIC commands the 100 has tone generation and 64 by 240 dot-addressable graphics.

When writing programs on the 100 for the Apple, some care must be taken with certain commands. CLS is HOME. There is no HTAB or VTAB but a PRINT @ statement. The 100 has PRINT USING and IF THEN ELSE. File commands are quite different, the 100 using more conventional syntax. Any POKEs, PEEKs or CALLs are meaningless in translation. In short, you can now do programming, but no debugging. That must wait until you arrive home and swap files. Interestingly enough, going the other way — programming on the Apple for the Model 100 — I find to be quite easy. I use a word processor program which provides me with an 80 column screen and complete editing commands. When I finish I dump the file to the 100 and see if it runs.

```
]LIST

10  REM

TRS-80/APPLE UPLOAD BY ART UDE

 CALL -A.P.P.L.E.   : NOV 1983

15 AD = 24576: REM FILE ADDRESS
20  FOR A = 792 TO 854: READ L
30  POKE A,L: NEXT
40  TEXT : HOME :D$ =  CHR$ (4)
50  INPUT "NAME OF FILE ";N$: IF
      LEN (N$) < 1 THEN  END
60  PRINT : PRINT "READY TO RECEI
    VE."
70  PRINT "REMEMBER, END UPLOAD W
    ITH A CTRL E."
80  PRINT "BEGIN UPLOAD - PRESS K
    EY F3"
90  CALL 792
100 L =  PEEK (8) +  PEEK (9) * 2
    56 + 1
110  POKE AD + L,220
120  PRINT D$;"BSAVE ^";N$;",A";A
    D;",L";L
130  PRINT "DONE.": END
200  DATA 169,194,133,57,169,7,13
    3,56,169,96,133,7,160,0,132,
    6,132,26
204  REM FOR MODEM IN SLOT #3
         CHANGE 194 TO 195 IN
         LINE 200
205  REM FOR RS-232 WITH CARD
         IN SLOT #1 CHANGE
         LINE 200 TO:
         DATA 169,193,133,57,
         169,5,133,56,169,96,
         133,7,160,0,132,6,
         132,26
210  DATA 169,0,133,8,133,9,32,12
    ,253,32,240,253,230,8,208,2,
    230,9
220  DATA 201,133,240,14,164,26,1
    45,6,200,132,26,208,231,230,
    7
230  DATA 76,48,3,169,129,133,56,
    169,158,133,57,96
```

reviews

There is always some "cleaning up," but using the full Apple screen with all the w/p help makes it worth while. I have come to admire the 100's Microsoft BASIC and wish the Apple's was as good. Others will be bringing forth similar machines but Tandy has the jump on everyone with the 100. Guesses range from 60,000 to 200,000 units sold the first year. I am very happy with the 100, find it highly compatible with many computers, not just the Apple, and (be it heresay) find using a new and better BASIC lots of fun.

One last item. There has been some speculation about the use of portable computers and electronic games on airlines. The major airlines have few hard and fast rules about computers and seem to be taking a wait and see attitude. Delta and Eastern have barred them without any tests. Just playing it safe and cautious (easy way out). United has not made any comment. American says ok, if they don't cause interference (isn't that what we want to know?). Northwest and TWA say likewise. The FAA says they don't think computers cause any problem but leave it up to the individual airlines (now that's helpful). In actual practice, no one will say anything to you if you open your bag and start using one, except nearby passengers and flight attendants who will all want a look see. The airlines may soon be installing electronic games in the fold-down tray tables and that should end the matter.

As a commercial pilot and Model 100 owner, I was anxious to do my own evaluation as I certainly wouldn't want them being used in the cabin if I thought there was any chance of interference up front. On the other hand, as a portable owner, I would like to use one on the airplane when just going along for the ride. As the FAA and individual carriers were avoiding the question, I took my 100 along for a trip. I checked it with a running program against radios and flight instruments: Heading and bank indicators, DMEs, radio altimeters, VHF and HF radio transmissions, ADF, marker beacons, VOR, ILS and glide slop indicators. No problems whatsoever. The instruments showed no difference with the computer on or off.

The era of the portable computer has arrived, and while I don't think they will be a viable machine for the single computer user, anyone with a computer at home or in the office will certainly be able to make excellent use of one. Try it, you'll like it. It'll be your "Apple to go."

```
]LIST

10  REM

APPLE/TRS-80 DOWNLOAD BY ART UDE

  CALL -A.P.P.L.E. : NOV. 1983

15 AD = 24576: REM ADDRESS
20  TEXT : HOME :D$ =  CHR$ (4)
30  PRINT D$;"CATALOG"
40  INPUT "NAME OF FILE TO DOWNLO
    AD ";N$: IF  LEN (N$) < 1 THEN
     END
50  IF  LEFT$ (N$,1) = "^" THEN 7
    0
60 N$ = "^" + N$
70  PRINT D$;"BLOAD ";N$;",A";AD
80  PRINT : PRINT "PRESS THE F2 K
    EY ON THE MODEL 100"
90  PRINT "HIT APPLE'S <SPACE BAR
    > TO CONTINUE ";: GET A$: PRINT

100 A =  PEEK (AD + I):I = I + 1
110  PRINT  CHR$ (A);: IF A = 220
     THEN 130
120  GOTO 100
130  PRINT "END OF FILE": END
```


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THE GAMING ROOM:

CONJURER'S SQUARE

J. Taylor

THE Conjurer's Square may be a matrix of any size on which the player is asked to select any number in the square.

The number is then ringed and at the same time all the numbers in the same row/col are deleted.

This is repeated (five times for a 5*5 cellular square) and the sum of the five numbers, apparently randomly selected, will be dramatically exposed by the Conjurer.

All clever stuff...

The matrix is built up from two randomly generated arrays(A(1–5) and B(1–5)) of which the individual elements are summed and placed in the matrix (C(5,5)).

The selection of five numbers in the manner described always results in the sum total of the two original arrays, since as you choose a number from the square you eliminate a number from each of the arrays.

Thus each ringed number will be in a different row/col. and the five rings equal the sum of five different pairs. QED.

The program plots this to the High–Res screen in an interesting way and is relatively simple to follow.

The monitor string routine lines 1200.1280 contain the numerals shape table for number 0–9 and three other shapes used in my program. (Thank you Mr. Lam!).

```
]LIST

10  REM

CONJURER'S SQUARE : J TAYLOR

     CALL -A.P.P.L.E.

15  REM ****INITIALISE****
20  HOME : HGR : HCOLOR= 3: TEXT

30  HOME
40  HTAB 11: PRINT "CONJURER'S SQ
     UARE"
50  HTAB 11: PRINT "**************
     ****"
60  PRINT
70  PRINT "DIRECTIONS.....": PRINT

80  PRINT "YOU MAY SELECT ANY NUM
     BER IN THE SQUARE.";:
90  PRINT :Q$ = "THE NUMBER WILL
     BE CIRCLED, AND THE": GOSUB
     1350: PRINT
100 Q$ = "FIGURES IN THE SAME ROW
     & COLUMN ARE": GOSUB 1350: PRINT

110 Q$ = "ELIMINATED.REPEAT FIVE
     TIMES, WHEN THE": GOSUB 1350
     : PRINT
120  PRINT "SUM OF YOUR SELECTION
     WILL ALWAYS BE THE";
130  PRINT :Q$ = "FIGURE PLACED B
     Y THE COMPUTER TO THE": GOSUB
     1350: PRINT
140 Q$ = "RIGHT OF THE CONJURER'S
     SQUARE.": GOSUB 1350: PRINT

150  VTAB 20: PRINT "JUST A MINUTE....."
160  PRINT : PRINT "LOADING NUMER
     ALS SHAPES TABLE."
170  GOTO 1210: REM     LAM STRIN
     G OF NUMERAL SHAPES
180  VTAB 20: CALL  - 868: VTAB 2
     2: PRINT "ANY KEY TO CONTINU
     E THE PROGRAM ";: GET Q$
190  HOME
200 TAL = 0:ANS = 0
210  ROT= 0: SCALE= 1
220 SHI =  INT (20000 / 256):SLO =
     20000 - 256 * SHI
230  POKE 232,SLO: POKE 233,SHI: REM
     TO START OF SHAPE TABLE
240  REM ****BORDER****
250 XLO = 1:YLO = 1:XHI = 279:YHI
     = 159
260  HCOLOR= 6
270  FOR I = 1 TO 2
280  FOR BO = 0 TO 6
290 SO =  PEEK ( - 16336)
300  HPLOT XLO,YLO + BO TO XHI,YL
     O + BO
310  HPLOT XLO,YHI - 6 + BO TO XH
     I,YHI - 6 + BO
320  HPLOT XLO + BO,YLO TO XLO +
     BO,YHI
330  HPLOT XHI - 6 + BO,YLO TO XH
     I - 6 + BO,YHI
340  NEXT
350 XLO = I * 12:YLO = I * 12:XHI
     = 278 - (I * 12):YHI = 158 -
     (I * 12)
360  HCOLOR= I + 4
370  NEXT
380  HPLOT 236,75 TO 258,75 TO 25
     8,87 TO 236,87 TO 236,75
390  REM ****PLOT 5*5 SQUARE****
400  HCOLOR= 3
410  FOR X = 90 TO 190 STEP 20
420  HPLOT X,30 TO X,130
430  NEXT
440  FOR Y = 30 TO 130 STEP 20
450  HPLOT 90,Y TO 190,Y
460  NEXT
470  POKE  - 16304,0
480  REM ****MAKE TWO RND ARRAYS*
     ***
490  FOR I = 1 TO 5
500 A(I) =  INT (25 *  RND (1)) +
     1:B(I) =  INT (25 *  RND (1)
     ) + 1
510  NEXT
520  REM ****NUMBERS FOR MATRIX**
     **
530  FOR I = 1 TO 5
540  FOR J = 1 TO 5
550 C(I,J) = A(J) + B(I)
560  NEXT : NEXT
570  REM ****PRODUCT TO SCREEN***
     *
580  FOR I = 1 TO 5:ANS = ANS + A
     (I) + B(I): NEXT
590 X = 200: REM  ANS TO SCREEN
600 AN$ =  STR$ (ANS):LE =  LEN (
     AN$)
610  FOR I = 1 TO LE
```

CONJURER'S SQUARE

```
620  XDRAW  VAL ( MID$ (AN$,I,1))
     + 2 AT 48 + X,81
630 X = X + 6
640  NEXT
650  REM ****FILL MATRIX****
660 X = 84:Y = 40
670  FOR I = 1 TO 5
680  FOR J = 1 TO 5
690 C$(I,J) =  STR$ (C(I,J))
700 LE =  LEN (C$(I,J))
710  IF LE = 1 THEN  XDRAW C(I,J)
     + 2 AT X + 6 + 20,Y: GOTO 7
     40
720  XDRAW  VAL ( MID$ (C$(I,J),1
     ,1)) + 2 AT X + 20,Y
730  XDRAW  VAL ( MID$ (C$(I,J),2
     ,1)) + 2 AT X + 6 + 20,Y
740 X = X + 20
750  NEXT
760 X = 84:Y = Y + 20
770  NEXT
780  REM ****PLAYER INPUT****
790 XX = 20
800  FOR FF = 1 TO 5
810  ONERR  GOTO 1300
820  HTAB 1: VTAB 21: CALL  - 868

830  HTAB (1): VTAB 21: INPUT "SE
     LECT A NUMBER ";N
840  REM ****RING SELECTED NUMBER
     ****
850 X = 73:Y = 33
860  FOR I = 1 TO 5
870  FOR J = 1 TO 5
880  IF C(I,J) = N THEN C(I,J) =
     0: DRAW 12 AT X + 20,Y: GOTO
     940
890 X = X + 20
900  NEXT J
910 X = 73:Y = Y + 20
920  NEXT I
930  GOTO 820: REM  INCORRECT SEL
     ECTION
940 K = I:L = J
950  VTAB 22: HTAB (XX): PRINT N;
     "+";:XX = XX + 3
960 TAL = TAL + N: REM PLAYERS RU
     NNING TOTAL
970 X = 73:Y = 33
980  REM ****DELETE ROW /COL****
990  FOR I = 1 TO 5
1000  FOR J = 1 TO 5
1010  IF I = K AND J = L THEN 1040
1020  IF I = K THEN  DRAW 13 AT X
     + 20,Y:C(I,J) = 0
1030  IF J = L THEN  DRAW 13 AT X
     + 20,Y:C(I,J) = 0
1040 X = X + 20
1050  NEXT J
1060 X = 73:Y = Y + 20
1070  NEXT I
1080  NEXT FF
1090  VTAB 21: HTAB 1: CALL  - 868
1100  INVERSE : VTAB 22: HTAB (5)
     : PRINT "YOUR SELECTION";: HTAB
     34: PRINT "=";TAL: NORMAL
1110  REM ****PLOT ARROW****
1120  FOR I = 20 TO 70 STEP 2
1130  XDRAW 1 AT 247,159 - I
1140 S =  PEEK ( - 16336) +  PEEK
     ( - 16336)
1150  NEXT
1160  XDRAW 1 AT 243,90: XDRAW 1 AT
     251,90: XDRAW 1 AT 241,92: XDRAW
     1 AT 253,92
1170  VTAB 24: PRINT "'CONJURER'S
      SQUARE'.....AGAIN Y/N ?"
     ;: GET Q$: IF Q$ <  > "Y" THEN
     1190
1180  HOME : HGR : GOTO 190
1190  TEXT : HOME : PRINT "THINK
     ABOUT IT !": END
1200  REM ****NUMERALS SHAPE TABL
     E****
1210  GOTO 1230
1220 HEX$ = HEX$ + " N D9C6G": FOR
     I = 1 TO  LEN (HEX$): POKE 5
     11 + I, ASC ( MID$ (HEX$,I,1
     )) + 128: NEXT : POKE 72,0:S
     0 =  PEEK ( - 16336) +  PEEK
     ( - 16336): RETURN
1230 HEX$ = "4E20: 0D 00 1C 00 22
      00 34 00 41 00 50 00 61 00
     71 00 81 00 91 00 9F 00 AF 0
     0 C0 00 DF 00 3E 24 2D 36 04
      00 DB DB DB 24 0C 2D 15 17
     35 36 1E 3F 0F 18 2C 0C 04 0
     0 DB DB DB 08 58 0D 18 36 36
      F6 2D 04": GOSUB 1220: CALL
     - 144
1240 HEX$ = "4E60: 00 DB DB DB 08
      18 0C 2D 15 F6 BF 17 2E 2D
     25 00 DB DB DB 08 18 28 2D 3
     5 1E 1E AD F6 3F 0F 18 04 00
      DB DB DB 2E 2D B5 23 0C 18
     24 BC 0A 18 17 04 00 DB DB D
     B 12 0E 2D 0D 18 24 1C 3F 27
      2C 2D 25": GOSUB 1220: CALL
     - 144
1250 HEX$ = "4EA0: 00 DB DB DB 32
      0E 2D 0D 18 E4 3F 27 0C 0C
     2D 04 00 DB DB DB 08 18 28 2
     D 35 1E 1E 1E 36 04 00 DB DB
      DB 20 0C 2D 15 F6 3F 17 76
     2D 0D 18 24 00 DB DB DB 92 2
     D 0D 18 0D 18 24 E4 3F 17 76
      2D 04 00": GOSUB 1220: CALL
     - 144
1260 HEX$ = "4EE0: 49 29 2D 2D 75
      0E 0E 0E 36 36 36 1E 1E 1E
     1E 3F 3F 3F CC E3 1C 1C 24 2
     4 24 0C 0C 0C 04 00 00 49 29
      2D 2D 0E 3F 3F 3F F7 2D 2D
     2D 2D 35 FD 3F 3F 3F 3F F7 2
     D 2D 2D 2D 2D 2D 2D 1C 0F 18
      0F 18 0F": GOSUB 1220: CALL
     - 144
1270 HEX$ = "4F20: 18 4D 91 92 3F
      3F 3F 3F 3F 3F 3F 2E 2D 2D
     2D 2D 2D 2D F5 FD 3F 3F 3F 3
     F 3F 3F 2E 2D 2D 2D 2D 2D 2D
      35 3F 3F 3F 3F 3F 3F 3F 0E
     2D 2D 2D 2D 2D 2D 1E 3F 3F 3
     F 3F 3F 0E 2D 2D 2D 2D 1E 3F
      3F 3F CE": GOSUB 1220: CALL
     - 144
1280 HEX$ = "4F60: 0B D8 18 18 70
      0E 0E 0E 2D 2D 2D 1C 09 0C
     0C 0C 04 FF 00": GOSUB 1220:
      CALL  - 144
1290  GOTO 180
1300  REM ****ELIMINATE INPUT REE
     NTER?***
1310  POKE 216,0
1320  PRINT "": HTAB (1): VTAB (2
     1): CALL  - 868
1330  ONERR  GOTO 1300
1340  RESUME
1350  HTAB (20 -  INT ( LEN (Q$) /
     2)): PRINT Q$: RETURN
```

CP/MAGIC:

PRINTER INTERFACING

Murray Arnow

IN the first article of this series, I gave a brief insight into the philosophy of the CP/M operating system and its ease of transportability. This and subsequent articles will be devoted to describing and modifying the CP/M BIOS as solutions to some of the problems encountered in areas such as printer interfacing, which will be treated in the present article.

I have found that the most common problem new users have with CP/M relates to printer interfacing. Apple CP/M treats the interface cards differently than does Apple DOS. When CP/M is booted for the first time, all the slots are tested for cards. The cards are identified and recorded in the Card Type Table located at F3B9H. The BIOS contains driver routines for parallel, serial, and communications cards. CP/M version 2.23 also has the driver routines for firmware cards. These card types are defined by Apple Computer and must follow the Pascal protocol. Cards not using the Pascal protocol may not work properly under CP/M and will require custom drivers.

A frequently encountered printer problem is that of the double line feed. This arises from the CCP (console command processor) and programs such as WordStar issuing line feeds after each carriage return. Printers with automatic line feeds will give double line spacings. Under Apple DOS the solution for the latter problem would be to send an escape sequence to the printer card; for example, [Ctrl-I] K stops line feeds after carriage returns on Apple parallel cards. CP/M won't acknowledge an escape sequence to set up interface card features.

This is because the CP/M driver routines use the output ports on the driver cards and bypass all special function routines. If you have the problem of double line spaces on your printer, the quickest remedy is to manually switch off the automatic line feed. If the printer's automatic line feed cannot be easily turned off then a BIOS modification is the only other answer. A routine to kill line feeds after carriage returns is included at the end of this article.

Now let's trace the path taken by a character when it is printed by an LST: device. LST: is what Digital Research calls the logical listing device (the printer). The BDOS communicates with the BIOS in terms of logical devices, and the BIOS interfaces with the physical devices. For the case of the logical LST: device the user has the option of the physical device being the console (TTY:), a line printer (LPT:), or a user list device (UL1:). These options are exercised by altering the IOBYTE in location 0003H.

To print an ASCII character with the high order bit cleared, the character must be placed in the Z-80 C register followed by a jump to the sixth jump instruction in the BIOS jump vector table. The LIST jump vector (i.e., LST: device) is at DA0FH for the 56K CP/M and at FA0FH for the 60K CP/M. The jump vector goes to a routine which checks the IOBYTE for the physical device (the default device is LPT:) and then vectors to that device.

The jump to the LPT: or the UL1: device is done by choosing one of two vectors found in the I/O vector table. The appropriate vector is loaded into the HL registers and an indirect jump is made to the desired output routine. The LPT: vector is found in locations F392H,F393H, and the UL1: vector is found in locations F394H,F395H. Microsoft has the default vectors both point to the same location; that is, FE55H in the 60K CP/M and DD3FH in the 56K CP/M. These vectors may be altered by the user to point to custom output driver routines.

The default output routine first loads the DE registers with the value 0001H. This is the slot number for the LST: device. The next operation is a jump to the appropriate driver routine. The jump location is filled during the cold boot after the card in slot 1 has been identified. The following table lists the locations of the BIOS driver routines for the 56K and 60K CP/M versions.

Output Routine Addresses	56K (Ver. 2.20B)	60K (Ver. 2.23)
Parallel card	DD31H	FE5BH
Communications card	DCDFH	FD0EH
Serial card	DD04H	FD71H
Firmware card	N/A	FDA9H

Using what we now know, let's go through some alterations. Suppose that you have two printers for your Apple and would like to configure the BIOS to recognize both of them as a logical LST: device. Let the interface card for the first printer be in slot 1 and the interface card for the second printer be in slot 5. Under the default conditions, the slot 1 card will be the only card recognized as the LST: device. Recalling that the logical LST: device can output to the printer as either the physical LPT: device or the physical UL1: device, we will let the slot 1 printer be the LPT: device and the slot 5 printer be the UL1: device. The LPT: vector at F392H, F393H already points to the driver routine for the slot 1 printer. We must change the UL1: vector at F394H,F395H to point to the driver routine for the slot 5 printer. Assume that there is a parallel card in slot 5, then an appropriate driver routine would be the following:

```
LXI D,0005   ;Set the slot to 5.
JMP 0FE5BH   ;The 60K parallel
               output routine.
```

The best location for this routine is the reserved memory area starting at F200H. The locations F394H and F395H then should be filled with 00H and F2H respectively so that the UL1: vector points to the new driver routine.

PRINTER INTERFACING

The slot 5 printer is selected by changing the IOBYTE. This is easily done by using the STAT command STAT LST:=UL1:. All subsequent printer output will go to slot 5. To return the output to slot 1, use the STAT command STAT LST:=LPT:.

Finally, here is the program NOLF which kills the line feeds after carriage returns. NOLF can be assembled using the assembler on your CP/M master disk. The routine is to be accessed through UL1: and will be for the printer card in slot 1. Of course you can modify it to suit your needs, but be careful that you don't violate any rules. NOLF when run modifies the BIOS in the Apple memory only and doesn't install the change on the disk's system's tracks. Future articles will discuss the system tracks, but for now if you desire to update the disk, you must use the CONFIGIO program.

```
;*******************************************************
;*                                                     *
;*                      NOLF                           *
;*                       by                            *
;*                    M. Arnow                         *
;*                                                     *
;*******************************************************

;A routine to eliminate the LF following a CR.
;For the UL1: device in slot 1 using a
; parallel driver card.
;For CP/M version 2.20B 56K.

          ORG   100H

WBOOT     EQU   0              ;CP/M warm boot entry.
LSTVEC2   EQU   0F394H         ;LIST device vector 2 (UL1:).
WRTPAR    EQU   0DD31H         ;Parallel card driver routine.
SLOT      EQU   1              ;Slot number.
CR        EQU   13             ;Carriage return.
LF        EQU   10             ;Line feed.
IOPATCH   EQU   0F200H         ;IOCB user patch area.

          LXI   H,LSTVEC2      ;Place UL1: vector in [HL].
          LXI   D,IOPATCH      ;Place start of user area in
                                                    [DE].
          MOV   M,E            ;Change UL1: vector to user
          INX   H              ; patch area.
          MOV   M,D

          LXI   H,PATCH        ;Move patched driver to the
          LXI   D,IOPATCH      ; patch area by using the
          LXI   B,LAST-PATCH+1 ; Z-80 LDIR instruction.
          DB    0EDH,0B0H      ;THE Z-80 LDIR.

          JMP   WBOOT          ;Exit through the warm boot.

OFFSET    EQU   IOPATCH-$      ;Assembler offset.

PATCH:    LDA   LAST+OFFSET    ;Load previous character.
          CPI   CR             ;Was it a CR?
          JNZ   NOTCR+OFFSET   ;Nope.
          MOV   A,C            ;Place current character in [A].
          CPI   LF             ;Is it a LF?
          JNZ   NOTLF+OFFSET   ;Nope.
          STA   LAST+OFFSET    ;Save current character.
          RET                  ;Return without printing
                                                 anything.
NOTCR:    MOV   A,C            ;Place current character in [A].
NOTLF:    STA   LAST+OFFSET    ;Save current character.
          LXI   D,SLOT         ;Place slot number in [DE].
          JMP   WRTPAR         ;Print the Character.

LAST:     DB    0              ;Last character buffer.

          END
```


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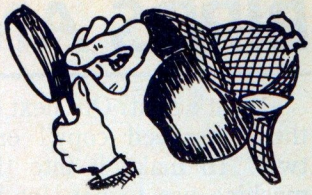
THE BIRDS AND THE BEES: GENETIC ENGINEERING (Part 2)

Rick Sutcliffe/Call -A.P.P.L.E. staff writer



LAST month we offered some background on the Apple][+ and pondered why a one time state-of-the-art machine reached such heights of popularity. In its attempts to close the door on mail-order price-cutting, Apple Computer, Inc. unwittingly opened the back door to an influx of "clones" or legal and not-so-legal copies, the subject of this month's discussion.

Strictly speaking, only the][+ machines themselves are clones (that is, genetically identical by virtue of being budded from the same branch stock). The others, which are meant to be exact copies (or at least functionally identical), stand at best in the same relation to their original as does a photocopy — something is always lost from the original.

To put it another way, my bicycle was a Rudge made by Raleigh and my brother's was a CCM. They looked the same and they worked identically (the latter having borrowed design features from the English cycles), but if we both ran into a parked car (he did regularly), his front forks bent up like pieces of spaghetti while mine stayed straight and ran true.

In other words, we are actually comparing Apples to overripe mangoes, and brother, does it show. There are hundreds of such ripoff versions, sold (so I understand) for as little as $200 in Taiwan.

From among these, I tested the widely advertised SYSCOM which, at about CDN $850, was a bargain over the Apple][+ by about CDN $500 at the time, but is hardly less than the price of the real thing today.

Is it "faithful to the core" as the ads claim? There are two answers to that. Yes, about 98% of the ROM code is byte-for-byte identical to the Apple, right down to the initials RW (which presumably stand for Randy Wigginton, who was responsible for much of the development work on Applesoft][.) coded at $F7FE. It is therefore almost completely compatible from a software and hardware point of view, and try as I may, I can think of nothing more to say which is positive.

Naturally then, the other answer is *no*. First, there is that other 2%. Except for SYSCOM replacing ACE 1000, the ROM appeared to be a copy of that for the Franklin rather than that of the Apple. "So what?," you say. So this: those nice little cassette ports don't work, because in this particular pirate chop shop they overwrote the cassette routines to handle upper-lower case patches. That's great for the ACE, which has no such ports anyway — but it makes no sense on the SYSCOM, which does have the ports, but does not have either a proper shift key or a lower case character generator. To see if your "cloned" ROMs are in this category, type the Applesoft cassette command SAVE. If you get back SYNTAX ERROR, you have the Franklin/SYSCOM style ROM's.

Ouch! What else? Well, the first one I got out of the box didn't work at all, and my assistant spies tell me that this is true of about 30% of these "clone" machines. (Apparently it's a question of cheap parts in the power supplies; shake one too hard and it's dead.) The second one, which came with no power cord (nor manuals, patch cords, or a warranty of any kind) did work, after a fashion.

Does that mean more bad news? You bet. The ugly black keyboard is an ultra cheap imitation — not as good as the very first][+ types. It had a clacky quality; the keys were hard to press fully, and they were not properly debounced. The left side of the key set was very prone to producing, say, two or three copies of the letter "S" for one keypress. Also, there were more unmarked keys than on the old Apple.

Moreover, the motherboard was based on the early Revision 6, so there was no encoder board. That means back to good old dissassemble and solder for a lower case adaption — and a naked (unprotectable) RESET key. The only changes on the motherboard were a few jumpers to allow 2732's for the ROM — three chips instead of six. The spaces for the old RAM configuration blocks were still there, for land sakes!

The signs of el-cheapo copycat non-engineering were everywhere, right down to the cheap plastic clips (instead of screws) holding the motherboard in place. The bottom line is a zero for technological innovation, a one for reliability, a six for faithfulness (because of the short cuts), and if you buy one of these junk heaps you've got rocks where your brains should be — the SYSCOM is more rotten to the core than faithful to the core — what's more, I see no prospect that any purely rip-off copy of the Apple is going to be any better.

It is to the considerable credit of the firm which supplied me with this machine (see the end of the article) that they have realized its limitations and have discontinued it in favor of a different type of workalike.

When you add in no service, no warranty, and a small chance of getting one that works (if it doesn't have a seizure of its own, it may have one by customs), you have some real losers here, folks. The latest trick — flogging cheap photocopies of the Apple manuals along with the ripped-off hardware — simply underscores the despicable nature of this thievery. I never thought I would see the day when whole books would be mass copied and sold openly like this.

I should add that word of my negative attitude towards these machines has gotten around, and I'm getting review requests by importers of other clones and workalikes. So stay tuned for possible updates in a few month's time. Don't expect much though. When stores will tear off the nameplate that came with the clone and put its own on instead, it gives you some idea of the kind of moral circus that is going on.

BIRDS AND BEES

What's next? Our next category is the "improved copy" or fraternal twin. To make it into this one, a machine has to have at least some re-engineering of the basic design, and this is where Franklin and their ACE 100/1000/1200 series fit in. The ACE 1000 was the one I tested and it has a mother board which, while functionally identical to the Apple, has at least been re-drawn. (That is, it is the same electronically, but it looks different.)

We get the same 98% software compatibility (without tape, 100%) to the Apple][+ as the SYSCOM, a slightly lower price than the plus (then, not now), upper/lower case which works, including an alpha shift lock, a keyboard layout more like a standard one (Selectric). We also get some additional keys which are missing from the plus and a keypad for fast spreadsheet entry (included are extra * , - , + , . , RETURN, and > keys). Unfortunately [Ctrl-Shift Λ], a vital control code for many word processors and printer set-up strings is not available on the Ace 1000 keyboard. There are also extra keys for Break ([Ctrl-C]), ([Ctrl-S]), and Tab ([Ctrl-I]) and the reset switch is located just under the front panel, well away from the Return key. There is a sturdier power switch, an installed fan and a heavier case, and the manual is well laid out and professionally and humorously written. So, we can say some good things, eh?

Well, we can say some bad ones too. Reverse compatibility is a problem — you cannot take a program containing lower case characters from the Franklin and run it on the Apple — at least not unless you have a utility which converts it. (Ahem — AMPERMANAGER has one — and why do you suppose I went to all the trouble of writing it?)

The keyboard, while in most respects an improvement, has some annoying drawbacks. These include the arrow keys not being in the home row, that meaningless [Ctrl-I] key labelled TAB and the fact that the Reset switch is now more vulnerable than ever because it can so easily be bumped. For some strange reason the square bracket key has the case reversed from standard Selectric, a silly mistake in an otherwise good layout. The video connector seemed fragile and the whole unit was more massive, and the therefore much less portable.

What's the end result here? We give a three for innovation (it is still virtually all copied, but the 1200 may be worth a higher rating) an eight for reliability, a nine for faithfulness — and you base your purchase decision on two things:

1) If the plus is still available in your area, can you get the Franklin for the same price or less? If so, it is a good buy. Otherwise, it just isn't that much of an improvement, especially when you realize that you still have to go to an Apple dealer to buy all the manuals. (Franklin's own is just a supplement.)
2) Are you comfortable with the ethical questions involved? The ACE is gussied up a little, but it is still mostly stolen — what are you teaching your children if you buy one? Until Franklin has a marketing arrangement with Apple for the firmware, I'll not have one of their machines in my school. (You should see their disk-based software. Acewriter, FUD (instead of FID) — very little creative energy expended.) Frankly, if they get away with this under the present laws then it is the law which needs to be changed.

Next, we turn to the "Apple Bus" machines, which category is well-represented by the Basis 108. (Pronounce that as "Bah-sis".) What distinguishes these from the previous classification? A complete re-engineering of the electrical design to achieve the same effect with substantially different circuitry, and *no* (or very little) copying of firmware either. Typically, you buy their machine, and obtain separately (or with disk drives) a legitimate copy of an Apple 3.3 master and/or a boot Pascal disk which you use to create a new "preboot" disk. The latter disk is always placed in the drive first; you pick the desired configuration from a menu, and when the preboot finishes, you insert your working disk and complete the boot. At this point, you are in a 100% Apple environment (usually on the "language card") without anybody stealing anything.

Now, is all that extra trouble worth it? It can be in the cases where substantial price breaks are effected (as is the case with the Orangepeel at $790 — not yet tested, and neither disparaged nor recommended) or where there are substantial enhancements to the fundamental design, which is certainly the case with the Basis 108.

And how! The Basis gives you a built-in 64K of memory,(expandable to 128K) serial and parallel interfaces, 80 column card, Z-80 card, RGB outlet, switched convenience receptacle and a very much enhanced detachable keyboard. Two μ-Sci drives complete the package at CDN $3690.

Now that is a very high end price, but it is good value. A similarly equipped *IIe* would sell for $300 to $500 more and to similarly equip a][+ would mean six full slots and a whole new keyboard. Speaking of which, let us begin at this point to extol the positive features of the 108.

This keyboard is the best I have seen yet on an Apple-style machine. Besides a keypad, it has fifteen user definable function keys, a cursor key section, extra keys for Home, clear to end of line, clear to end of page, and [Ctrl-X] (delete line). There are other extra keys for numerical operations, auto repeat on all keys, a DEL($7F), a second Return on the pad, and a Tab ([Ctrl-I]). There are more characters available even than on the Ace, let alone than on the plus. The detachable nature of the keyboard offers the possibility of buying other different (better?) ones instead. Just plug them in. Moreover, decoding is on the mother board — a feature which offers much greater flexibility.

Not having to be concerned about the two interfaces, 80-column and Z-80 boards is another plus. It is quite possible that many users of this machine will never use the five slots which still remain available once the disk controller is installed. The rear connectors are installed on the back panel, eliminating the need to open the machine to connect peripherals, and there are knockouts for more.

The firmware which is present is a clever adaptation of the Apple F8 ROM. It has no cassette I/O, but has the 80-column software in its place. Most common routines follow the Apple Autostart quite closely, but overall we do have some good original work here.

Obviously I wax enthusiastic — what about disadvantages? Well, there are some, but most of them are relatively minor. The keys are stiff and do not push easily; the machine is heavy and has a very large footprint; the CLEOP and CLEOL keys are not marked (why not?); the two different kinds of arrow keys cause confusion; and Reset is very illogical and awkward to achieve (push CTRL and both shift keys at once). Also, the double boot takes some getting used to, as does the fact that the motherboard has only the F8 ROM (though it has room for more 2716's).

For the machine language buff like myself however, there is a more serious problem. While there is for the most part downward compatibility to the plus, there is not very good lateral compatibility on this level to the *II*e. The two sets of engineers have added almost all the same enhancements for managing the 80-column, extra memory, and other features — but they have done it in entirely different ways. This means that the new switches for the extra functions are NOT at the same memory locations for both machines — a potentially serious problem for portability. Example: You toggle 80-column mode on with a write to $C00B in the Basis, but to $C00D on the *II*e, and the return to 40-column toggle is at $C00A in the Basis and at $C00C in the *II*e.

Moreover, because the keyboard can generate different kinds of output than the Apple and the screen character set is different under some circumstances, great care must be taken when using the versions of the software which attempt to employ the full upper/lower case. (Yes, and alpha shift lock is *two* keys, while full shift lock is only *one* — which is utterly ridiculous!)

Nevertheless, having still another version of the F8 ROM is not without its problems. There are two areas where this becomes significant: in copy-protected programs which calculate a check-sum value and compare it against the ROM (and crashing if they don't match), and programs such as my AMPERMANAGER which relies heavily on techniques such as reading the state of the modified shift key on the plus. As to why this doesn't work on many of the copies, I'll explain next month and also present a chart comparing the features of the Apple][+ against those of the "counterfeits" and enhanced machines.

Read the manual, right? It turns out that while a read at C063 is the same as on the Apple (contents of pb3), a write (which includes an ASL) switches in the $2000-$3FFF portion of the alternate 64K bank of memory. Since AMPERMANAGER overlaps this range, it was getting creamed. Time to do a rewrite job. By the way, that 8K as a time switching scheme for the extra memory is quite flexible...I can see some interesting possibilities there.

Please tell our advertisers you saw it in Call —A.P.P.L.E.

WRITING THE WRONGS

the wrongdoers

A note of correction on the article from *Call -A.P.P.L.E.* volume VI, number 9 (Sept. 1983) — "Ignoring ? EXTRA IGNORED."

The initialization routine called TRANSFR has a couple of bugs in it. At line 45, the instruction:

```
45 LDA  STACK-1,X
```

assembles as a zero page address, offset by the X register. The author is seeking the correct byte thinking that the X register will be added to the address $FF to obtain the effective address. But the 6502 will wrap around the zero page when indexing from zero page, therefore, obtaining an address below the stack. There are two solutions.

1) Force the assembler to use an absolute addressing technique while still using the base address of $FF:

```
45 LDA: STACK-1,X  (note
                    the colon)
```

This will assemble as:

```
0304: BD FF 00 LDA:
STACK-1,X
```

2) Decrement the X register and use STACK instead of STACK-1.

Additionally, the address returned by the JSR WHERAMI is TRANSFER-1. Therefore, line 47 should read one of two ways:

1) `ADC #CHEKCHR-TRANSFR-1`
2) `ADC #CHEKCHR-(TRANSFR+1)`

Martin D. Smith
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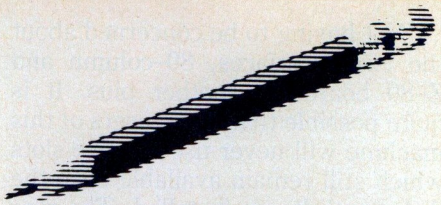
Pittsburgh, PA 15218

Our apologies to Ari and Dov Freud. Their original listing correctly used the absolute mode but we failed to pick up on it when we assembled it for publication. — ed.

WRITE —A.P.P.L.E.



the readers

Lister Modification

Dear Val,

TWO of the *Apple Carpenter* programs, *The Cruncher* and *The Lister,* are among my most used editing programs. However, as a matter of personal taste, I have always disliked the fact that *The Lister* prefixes each replacement statement with LET. Recently you were kind enough to put me in touch with Wayne Eastwood, the author of *The Lister.* I was impressed by his ability, for in a five minute telephone conversation, he was able to tell me how to remove the printing of the LET from the program. I, therefore, am sending you the changes so that others can modify their copies of *The Lister* if they so desire.

For *The Lister,* the LET token is setup for printing by the following code;

```
8895:   48       PHA
8896:   A9 AA    LDA #$AA
8898:   20 5A 89 JSR $895A
889B:   68       PLA
```

In order to delete the LET replace the seven bytes given above by NOPs, (EA), and BSAVE the program back onto an appropriate disk using A$8600 and L$0ABA. (I never destroy an original, even if I am dissatisfied with it.)

Your new *Apple Carpenter II* disk is now out and I am delighted with it also. In order to make the same change to *The Lister II* on this new disk, change to following code to NOPs (EA);

```
86AA:   48       PHA
86AB:   A9 AA    LDA #$AA
86AD:   20 9E 87 JSR 879E
86B0:   68       PLA
```

and BSAVE the program, using A$8000 and L$1140 this time.

I must emphasize that these changes are due to the expertise of Wayne Eastwood. I am only reporting them.

Sidney A. Powers
4 Crestview Drive
Fort Salonga, NY 11768

No Sub/Superscripts On Apple Printer

Dear sirs,

I read with great interest the *A.P.P.L.E. Doctor* in the August issue of *Call –A.P.P.L.E.,* particularly the question on doing subscripts and/or superscripts on the C. Itoh Prowriter. The good *Doctor* asks for anyone to correct him on his failure to get the Apple DMP to function properly. Well, I can.

I used to own an Apple Dot Matrix printer, and I had the same problem. Although Apple Writer supports subscript/superscript mode, I couldn't get it to work on my Apple DMP. Furthermore, although the Apple Writer manual gives the subscript/superscript codes for other printers, it is strangely silent on its own Apple DMP. Since my children wanted to use my word processor to do term papers, etc., which require subscripts/superscripts for footnotes, I was naturally concerned, and called the Apple Computer, Inc. "Hot Line" to find out what was the matter. The Apple Technical Representative who answered, rather sheepishly admitted that the Apple Dot Matrix Printer is *not capable* of subscript/superscript.

Furthermore, this capability was purposely given up in favor of downloadable character sets, according to him, which are *still* not available for this printer.

For this reason, and also because it was very difficult to soft switch National Character sets from within Apple Writer (I do a fair amount of writing in foreign languages), and because of the poor manual (or lack of it) which accompanies the Apple DMP, I sold it and now own an Epson FX–100, with which I am extremely pleased. It can do superscripts, subscripts, italics, emphasize print, foreign characters, and almost anything else I could want from a printer, and all this from within Apple Writer.

Incredible, but true! You can't do subscripts/superscripts on an Apple DMP!

Jerry Battenhouse
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Williamson, GA 30292

Z80 Slots

Dear A.P.P.L.E.

After purchasing an ALS Z–80 card about three months ago, I eagerly took it home and placed it into slot 4 of my Apple][. I booted up the CP/M system disk, and bingo, I was working in CP/M. However, the system that is shipped when you purchase the ALS card alone is configured for 48K of memory, so as to fit in a "standard" Apple. As I has installed an Andromeda 16K card about two years ago, I attempted to use the "BIGSYS" program that was included with the ALS card to reconfigure CP/M to work with the extended memory.

The program seemed to run fine, but the disks that were produced with the 64K CP/M would not work! They would boot, but any attempt at reading the directory, or even running the ALS "HELLO" program would lock up the computer.

So, I wrote to ALS and Andromeda about the problem and received word from Andromeda that their card wouldn't work with the CP/M 2.2 that is shipped with the ALS card.

Thinking that the 16K card was the problem, I ordered a new card from A.P.P.L.E. to "fix" my problem.

Well, I received my new card last week, and plugged it in and tried one of my 64K CP/M disks. Guess what? The same thing was happening. The system would lock up. So, this time I called ALS.

In my conversation with a technical representative at ALS (I think her name was Lorrie) she asked if I had tried the card in slots 4 and 7. As I thought the "standard" slot for a Z–80 card was slot 4, and the 48K version of CP/M worked there, I had never tried slot 7. Sure enough, there in the instruction booklet, it mentioned that the card should be placed in slot 4 *or* slot 7.

After moving the ALS card to slot 7, lo and behold, my 64K system would now boot up and operate with no trouble!!!

I'm hoping that this may be of some help to someone in the same or similar situation. Be sure to read *all* of the instructions, and try everything before giving up.

Steve Nelson
2006 Spruce Pt. #2085
Arlington, TX 76010

Move Spreadsheet RAM

Val,

I just made a remarkable discovery the other day. I acquired a Mountain Computer RAMplus board for my Apple][plus. It came with 16K and I added another 16K to it. It works very well in the *IIe* and in my][+ with THE Spreadsheet. The discovery I made was with the *IIe* and the RAMplus board in slot 3 (not the 80 column text slot). I still had 62K of memory left to use and when I enabled the 80 column card everything still worked. I developed a model that used most of the 62K and everything still works. This brings up some interesting possibilities about other memory boards and multifunction boards and phantom addresses, especially for the Apple owner concerned about over loading the system.

George Mochizuki
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Madera, CA 93637

Printer Causes Surge

Val Golding

Here's a quick tip you might want to pass along to your other readers. I had to learn this the hard way. If anyone else is

using a Prowriter 8510A printer and has it connected to the A.C. outlet on the back of a Kensington System Saver . . . do yourself a favor and leave the printer turned "off" before booting from a cold start. Apparently the printer really throws the Apple for a loop (not the FOR/NEXT type) when all the power is turned on at once. A surge or a spike from the printer firing up at the same time as the computer was starting up caused more of my programs to crash then you can imagine. Since I've been turning the printer off after booting up, I haven't had any problems with crashes.

Glen M. James
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Starkville, MS 39759

Password Help

Dear Editor:

The article "A Complete Password System" by Jason K. Mintz in the May, 1983 issue of *Call -A.P.P.L.E.* was excellent.

I am planning to initialize our Applesoft Payroll Cost Accounting Program with the Password System.

I would like to know if Jason or other readers know of or have written a Password System using CP/M and Microsoft Basic for the Apple][.

I would greatly appreciate any information.

Vickie L. Shearin
11811 62nd Street North
Largo, FL 33543

80-Column Thunderclock

Editor:

I wonder if anybody else out there has been fascinated and frustrated by the SCREEN program included on the Thunderclock Plus Basic Software diskette. This is a marvelous program that runs under interrupt control and continuously displays the time on the screen while allowing the user to operate under Applesoft or Integer Basic. The only problem is that it insists on using the 40 column screen which I simply cannot bear. The Thunderclock people, for reasons known only to themselves, have provided only the object code for this program and no source listing. Don't these people realize that as hardware vendors they should provide source listings of all their programs? The more uses we hackers find for their clock, the more sales this will generate. Why on earth do they want to keep secrets from us? I disassembled the thing only to find that it loads and runs another program for which no listing is provided. At that point I gave up. All I want to do is run the thing in 80 columns on my Videx Videoterm. Has anybody out there figured out how to do it?

Robert Dewart
191 Santa Monica Blvd.
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Sleep-Typing

Dear Nellie Hacker,

Thank you for your valuable information on the INIT command. It was exactly the sort of capability I was looking for. I would, however, like to point out one thing concerning your advice on how to only write DOS to the disk from the monitor. It seems when I tried this, I ended up with a disk which booted perfectly, but failed to run my HELLO program ('Mercy me, I wonder how that happened?') The obvious thing was to check that the ASCII code for my HELLO program was properly tucked away in the primary filename buffer at $AA75-AA93. It wasn't, so I put it there and wrote DOS back to the disk. Again, however, it failed to run my HELLO program. So I pulled out my tattered listing of DOS and after several minutes I discovered the following: After DOS has been loaded into memory following booting, it jumps to $9D84 to perform a coldstart. After doing some housekeeping, it tests the value stored at $AA5F, which according to *Beneath Apple DOS,* contains the index of the last command X!.{. (This code is at $9E20) If this value is not 0, DOS thinks it was not just booted up and hence skips running the HELLO program. If the value is 0, this means the last command was INIT, which should be the case if this DOS was written to disk through normal means. Since we are "cheating," so to speak, we are responsible for placing a zero here before writing DOS to disk by such non-standard means.

I point this out not only because of *your* oversight (although Rick does leave off your adventure story with the idea that he was not presenting any sort of complete package therein), but because this same oversight exists in the program SAVEDOS on the All About DOS diskettes. Since I did not realize what was causing the problem at the time, I ended up handpatching the two speed-up programs into DOS on my disk, and now use a commercial utility to replicate this DOS from one disk to another. Now that I know, the possibilities are endless. You might want to pass this information on to the members, as I'm sure some of them have noticed the same problem I did.

Jeffrey W. Baumann
UTMB Substation 1 Box 21
Galveston, TX 77550

Nellie Hacker replies: *Obviously I typed Mr. Sutcliffe's article in my sleep. We were aware of and did discuss both points raised by Mr. Baumann, but didn't write them down.*

I take full responsibility for the oversight as I am not normally as absent-minded as he is. In the implementation contained in AMPERMANAGER, the command &PUTD correctly gets the command valve to zero. Of course, it also accepts the file name as part of its syntax, so simply type &PUTD "HELLO" and you're done.

I shall try to keep a closer watch on Mr. Sutcliffe's columns in the future.

Nellie

Continuous Printing

Dear Sir:

Recently I was using a printer program that utilized a series of text files and wanted to continue printing on the same page when the next text file was loaded. This presented a problem since it was necessary to clear all the registers before loading the next text file and also have the program remember the line number where the printer stopped. In the case where the skip over perforation command is programmed by the total line count the following is a simple solution to the problem:

```
XX10    — — — — (initial part of
        the program)
XX20    HOME : CLEAR
XX30    X = PEEK (2500) (line
        number input)
XX40    (NExt text file loading)
        : and printer program)
XXX10   X = X + 1 (line no.
        count)
XXX20   IF X = > 50 THEN X =
        0:PRINT CHR$(12) (page
        advance)
XXX30   GOTO or ONERR GOTO
        XXX50 (program termina-
        tion step)
XXX40   GOTO XX40 or NEXT I
        (program loop)
XXX50   IF X = > 50 THEN X =
        0:PRINT CHR$(12) (page
        advance)
XXX60   POKE 25000,X (save line
        count)
XXX70   GOTO XX20
```

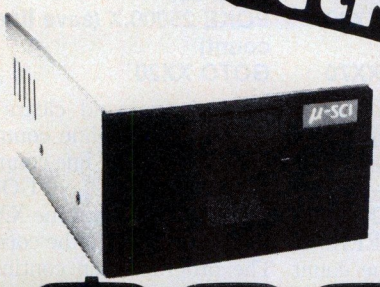
Since the clear command clears all registers including "X" the line count is lost. Line XXX60 POKEs the line count at memory location 25000 and on GOTO XX20 all registers are cleared. Line XX30 PEEKs at 25000 and sets X to the correct line count. The program then continues with no interruption in printer spacing. The above program was used with an Epson printer and the line count inputs X = X + 1 were changed to x = X + Y, where Y was equal to the total number of lines (up to about 5) for a series of print commands that should remain together on a single page for clarity of text.

This technique can be used to save other whole numbers or letters as a CHR$ input (0 to 255) and is particularly useful when the program contains a large number of variables that must be cleared or set to 0 for continuing operation. The memory location used should be checked to make sure the program does not extend beyond that location, if it does pick a higher location.

Charles S. Stokes
127 Madison Road
Willow Grove, PA 19090

```
]LIST

10  REM

    SO WHAT DID YOU EXPECT DEPT.

E PAIGE DARRAGH : CALL -A.P.P.L.E

100   GOSUB 500
110   HOME : HGR
120   DATA  83,79,32,87,72,65,84,3
      2,68,73,68,32,89,79,85,32,69
      ,88,80,69,67,84,32,63
130 B = 140:C = 80:A$ = ""
140   FOR I = C TO 0 STEP  - 1
150 A = I + 32: GOSUB 330
160   HPLOT 0,I TO B - 1,I: NEXT
170   FOR I = B TO 2 * B - 1
180 A = I - 108: GOSUB 330
190   HPLOT I,0 TO I,C: NEXT
200   FOR I = C + 1 TO 2 * C - 1
210 A = I - C: GOSUB 330
220   HPLOT B,I TO 2 * B - 1,I: NEXT
230   FOR I = B - 1 TO 0 STEP  - 1
240 A = I + 32: GOSUB 330
250   HPLOT I,C TO I,2 * C - 1: NEXT

260   POKE 50,127
270   FOR Z = 1 TO 24
280   READ A:B$ =  CHR$ (A):A$ = A$ + B$: NEXT
290   FOR I = 1 TO 16:C$ = C$ + " ": NEXT
300 A$ = A$ + C$: SPEED= 220
310 A$ =  MID$ (A$,2) +  LEFT$ (A$,1)
320   VTAB 22: PRINT A$: GOTO 310
330   POKE 228,A: POKE 768,A: POKE
      769,A: CALL 770: RETURN
500 HEX$ = "300:20 0 AD 30 C0 88
      D0 5 CE 1 3 F0 9 CA D0 F5 AE
       0 3 4C 2 3 60 N D9C6G": FOR
      I = 1 TO  LEN (HEX$): POKE 5
      11 + I, ASC ( MID$ (HEX$,I))
       + 128: NEXT : POKE 72,0: CALL
       - 144: RETURN
```


Laing Electronics



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One of the most dramatic changes in the Apple IIe compared with the II+ has been the lower cost of doubling your available text area for use with spreadsheets, word-processing and other business programs.

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The **NOVA-80**™ eighty-column card for the Apple IIe comes with eight empty sockets which accept standard RAM chips. You benefit from the increased versatility of 80 columns now and can simply plug in 64K RAM when you want it. NO CUTTING OR SOLDERING!

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For more information on the Dark Star Systems range of products, just leave your name and address with our 24-hour answering service at (413) 584-7600. We regret we cannot return all calls.

TO ORDER: Mail check payable to Dark Star Systems. Add $3 for shipping in the U.S. ($15 elsewhere). Mass. residents add 5% tax. COD costs £5 extra (not available outside U.S.)

darkStar SYSTEMS

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Circle 8 on Reader Service Card

Only one copy system lets you backup 64k programs in 20 seconds flat...

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...the Snapshot Copykit™ for Apple IIe and II+

While other manufacturers have been making wild promises, we've been quietly developing the superior copy system you've been waiting for: the SNAPSHOT COPYKIT.

THE FLEXIBLE CARD — The SNAPSHOT COPYKIT is a board for all systems. It sits in any slot on the Apple IIe, II+ and II as well as software-compatible machines like the Basis 108 and the Franklin Ace. So, you can upgrade your system without paying for another card.

Although **NO LANGUAGE CARD/16K CARD IS REQUIRED**, the SNAPSHOT COPYKIT can be used with any memory card and all peripheral cards.

The SNAPSHOT COPYKIT is the only copy card that stays up-to-date. Because all its software is in RAM, rather than inflexible ROM, the new enhancements we continually develop are made available to you at nominal cost — immediately.

THE USER-FRIENDLY CARD — We refined backup techniques for two years to make the SNAPSHOT COPYKIT just right for you, whether you're new to the Apple or a seasoned pro.
Other copy cards force you to use complex, unreliable procedures and repeated booting of 'utility disks' to copy programs larger than 48K. Outdated 'nibble copier' programs involve frustrating trial-and-error parameter changes. Only the SNAPSHOT COPYKIT backs up all 64K memory-resident programs (and most larger programs too) with one simple menu and one press of the trigger.

THE POWERFUL CARD — The SNAPSHOT COPYKIT gives you back the power over your computer that some programs try to take away. You can interrupt a running program, make a backup, list the program (even if it's 'unlistable'), disassemble it, step and trace it, modify it and resume running it. The program is not disturbed in any way and never knows it was interrupted. You can view its graphics, print them (if you have a graphics card) and much more. You can even temporarily suspend one program while you use another.
All backups are automatically BRUNnable files that you can move to hard disk. Our state-of-the-art compression facility lets you put a number of backups on one floppy.
With powerful features like these, it's no wonder that BYTE magazine called SNAPSHOT "The Ultimate Unlock System".

The SNAPSHOT COPYKIT has many more features for programmers, gamesters and others. Write for our info packet or leave your address and questions with our 24-hour answering service at (413) 584-7600. All SNAPSHOT owners receive our 'Technical Hot-Line' number for instant technical guidance.

PRICE: $139.95

(Snapshot Two is still available for the Apple II+ and Franklin Ace at $119.95. 16K Card required; please specify brand when ordering).

TO ORDER: Mail check payable to Dark Star Systems. Add $3 for shipping in the U.S. ($7.50 to Canada, $15 elsewhere). Mass. residents add 5% tax. COD costs $5 extra (not available outside U.S.).

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The PROF Parent/Teacher System includes PROF and materials for programming lessons.

Send name, address, zip, phone number, and product name to H.U.M.A.N.S., Inc., P.O. Box 352, Sterling, VA 22170. Va. residents add 4% sales tax. **OR CALL (804) 525-3441.** Allow 4 weeks for delivery.

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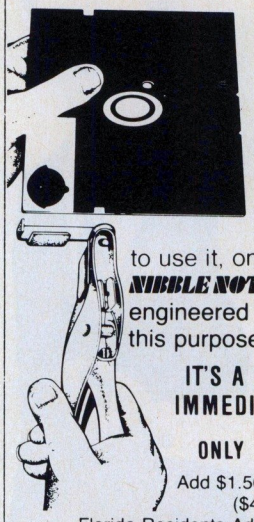

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Circle 39 on Reader Service Card

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for 5¼" or 8" diskettes

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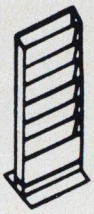

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TOMORROW'S APPLES TODAY

Kevin O. Donohoe/editor

NOTE: These products are presumed to be state-of-the-art. Call -A.P.P.L.E. does not necessarily endorse products published in this column as **we** have not evaluated them.

EDUCATIONAL SOFTWARE BY PROGRAM DESIGN, INC.

PDI's product line of over 40 titles consists of five types of home computer software:

1) Preschool games and interactive storybooks,
2) Computer tutorials and courseware,
3) Educational games,
4) Innovative arcade games and
5) Programming utilities.

PDI takes an audio-visual approach to educational packages. Interactive storybooks use a voice track and computer animation to teach clearly defined and measurable educational objectives. PDI was the first educational software producer in the home computer field, and has a substantial number of firsts in that field.

PDI's better known titles include the *Step by Step* series on how to program small computers, *Sammy the Sea Serpent, The IQ Builder* series, and *Preparing for the Sat.* PDI also designed the *Invitation to Programming* series now being sold by Atari. *Moonbase IO,* an arcade with a voice track, won the 1982 Arkie award for most innovative computer game of 1982.

For more information, contact Elinor Ruskin or Kathy Fortmeier, Program Design, Inc., 95 East Putnam Avenue, Greenwich, CT 06830, (203) 661-8799.

COMPUTER WORKBOOKS HELP KIDS "TUNE-IN"

This fall, Scholastic Productions, Inc. will launch two new workbook series: *The BASIC Computing* and *New Tech Books* (each priced at $2.95) to aid in teaching elementary and secondary school students about computers.

BASIC Computing, a set of six workbooks each corresponding to one of the six elementary grades, is a program designed to teach computer literacy. Assuming no previous knowledge of computers, each 64-page workbook features skill-building exercises, which can be taught with or without the use of the computer.

The New Tech Books bring computer competency to the secondary grades, through such titles as *Computer Thinking, Word Processing, Understanding Computers, New Jobs/New Technology.* In addition, the *Computer Dictionary* is a handy reference which serves as a companion volume to the four worktexts.

The BASIC Computing and *New Tech Books* are part of Scholastic's company-wide effort to provide computer information to those involved with educating young people. Scholastic also publishes *Teaching and Computers,* a new magazine for elementary teachers who want to incorporate computer software into the curriculum; *Electronic Learning,* the definitive reference magazine for administrators who are purchasing software for schools and school districts; *The Bank Street Writer,* the first word-processing program for students (grades 4-6); the *Activity Book for the Bank Street Writer; Wizware,* fun-learning children's software programs for home use which also include *Microzine,* a magazine-on-a-disc; and *Family Computing,* Scholastic's first consumer magazine, which is designed to help parents and children learn about their home computer and its use.

Scholastic Productions Inc., 730 Broadway, New York, NY 10003, (212) 505-3000.

COMPUTER CONNECTION

The biggest gap in the mushrooming use of computers in schools has just been filled. Instructional Software, Inc. has just introduced *The Computer Connection for Teachers* — providing the first opportunity for teachers to learn about computers by actually using one.

The most effective tool yet devised for overcoming "computer anxiety," this new self-instructional computer program was developed by two experienced teachers who have been designing educational software for seven years.

No prior exposure to computers is required. Any teacher with access to an Apple][or *//e* computer can, within minutes, be learning computer basics as well as a wide range of classroom applications. Uneasiness quickly gives way to fascination as the teacher discovers new approaches to using computers such as simulations (of a scientific process, for example), or examples of tutorial lessons to help a slower student catch up with the class.

The price for the fully-guaranteed disk program with documentation is $75.00, with discounts for bulk sales. It is available on a 15-day examination basis. To order, or for further information, write: Instructional Software Inc., 1278 Massachusetts Avenue, Cambridge, MA 02138, or call: (617) 492-0386.

ASTRONOMY PAC

The Astronomy Pac comes with detailed instructions and is simple enough for beginners (recommended for ages 12 through adult) but is so powerful even advanced astronomers will find it invaluable. Perfect for teachers and students.

The program generates its own almanac data and contains information on Aries and 57 of the most prominent stars. This enables the user to print the location of these stars for any time — 1983 until the year 2000, from any location on earth. Also includes a star identification program. Anyone who has ever used a mechanical starfinder will delight in the east of use and precision of this program. Tell the computer the time and date and your approximate position. Then input the height of the star (measured using the simple astrolabe included in this pac), and the azimuth (compass bearing) as measured using the included compass. The computer then determines which star you observed and displays its name and constellation.

Complete with software, instructions, astrolabe, compass, and book — *The Stars* by H. A. Rey. $59.95. Specify: Apple][Plus or *//e* on disk (DOS 3.3).

For more information contact Lee Woas, Celestial Software, 3010 Warrington Ave., Lakeland, FL 33803, (813) 686-3311.

EDU*COMP

EDU*COMP, an educational consulting firm, is offering a review service for parents and educators. It will review any educational software program a family or school is planning to purchase. That review will be based on the specific needs of the individuals or schools involved. Parents and teachers will no longer need to buy software without knowing if that package will indeed meet their purposes. EDU*COMP offers this service at the nominal price of twenty percent of the retail cost of the package. There is a twenty-five dollar minimum fee.

—→

TOMORROW'S APPLES TODAY

Let EDU*COMP know the name of the program and its producer; who it is for (age and grade, or level and subject); how it is to be used (learning disabled youngsters, regular classes, etc.); and what sort of hardware is available. Within twenty days to a month EDU*COMP will review the package and send you an in-depth statement of its possible value to you. The purchaser will then be able to make the decision to buy based on expert opinion tailor-made to his/her needs. All reviews will be written by educators with at least ten years experienced in the classroom.

EDU*COMP Reviews, 35 Bretton Road, Manchester, CN 06040, (203) 643-6223.

ARCADE BOARD

The Arcade Board is a sprite-graphics and sound effects board for the Apple][,][+, and *//e* computers that generates true arcade-quality color graphics and sound effects, making it possible to have real arcade action and sound on an Apple computer. This impossible because the Arcade Board uses the some powerful, special-purpose video and sound chips used by many of the popular coin-operated video arcade game machines and the upcoming MSX standard (to be adopted by Microsoft and many of the new low-end Japanese and U.S. personal computers) — these are the TMS9918A Video Display Processor and the AY-3-8910 Programmable Sound Generator. Features include 16 colors available simultaneously in all 3 graphics modes, two High-Res modes with a true resolution of 256H x 192V (not the actual 140H x 192V of the Apple), 32 sprites for super-easy animation, 16K on board RAM for storing up to 14 pages of high resolution 16 color graphics, Low-Res mode of 64H x 48V, 60 Hz interrupt for synchronized page flipping without glitches, 3 independent tone channels with 9 octave range and separate volume controls, 1 noise generator, automatic envelope control, 16 software-selectable filters, and only one monitor or TV is required. The hardware is so powerful that a BASIC programmer can easily create spectacular color graphics and sound effect, which far exceed anything a stock Apple can do, even when programmed in machine language. And to make it even easier, over 40 additional graphics and sound commands have been added to Applesoft BASIC, making it possible to create exceptionally good arcade action games with the east and convenience of BASIC, but with the speed of machine language. The Arcade Board can be used to develop arcade games for the coin-operated arcade machines, the ColecoVision video-game system, the new MSX standard computers, as well as an Apple][equipped with an Arcade Board. The Arcade Board comes with an 80 page manual and tutorial, a demo disk, with over 20 program demos, games, and utilities, as well as the over 40 extra BASIC commands. The Arcade Board is available for $225 with a 30 day money-back trial period. If not available at your local dealers, you may order direct from Third Millennium Engineering C.O.D. or prepaid (VISA or MasterCard accepted). The Arcade Board has a 180 day warranty.

For more information contact: Third Millennium Engineering Corporation, 1015 Gayley Ave., Suite 394, Los Angeles, CA 90024, (213) 473-2101.

MORE PIXEL PACKING POWER

Visual Data Enterprises introduces the V-Series of high resolution graphics software, with the Number Nine Graphics System for the Apple. This software/hardware package provides high quality, low cost computer graphics capabilities by upgrading the color, resolution, and drawing speed of the micro to that of more expensive systems.

Based on the NEC 7220 VLSI Graphics Display Controller chip, with 128K of onboard memory, the system provides resolution up to 1024x1024, 16 colors at 512x512, and an optional 4,096 color lookup table. The NEC processor, operating at a speed of up to 5.5 MHz and a video data rate of 88 MHz, provides fast, vivid, and high quality displays. It frees up memory normally used for graphics display, allowing for expanded program size and capability. The board being slot resident, is easy to install and can be connected directly to any RGB monitor.

Retail software package prices range from $95 to $245. Retail price for the option-1 Number Nine Graphics board featuring 512x512 resolution with 16 colors is $895.

For more information, contact Visual Data Enterprises, P.O. Box 30563, Los Angeles, CA 90030, (213) 250-4977.

THE APPLE BLOOMS!

Hollywood Hardware's new program development package for the Apple][and *//e* installs such crucial professional features as a Global Program Line Editor, definable Function Keys, Output Formatting, and Structured Program Aids with one special firmware card. The package requires no disk loading and uses *no* memory space, yet speeds editing up to 5 times, using Insert, Delete, Search, Replace, and more. Powerful Macros perform common tasks like Catalog and List with one keystroke, and you can program and nest *customer* Macros to produce complex command sequences.

Additional "&" utilities extend Applesoft (e.g. "IF, THEN, ELSE" and "PRINT USING"), perform Searches, Number Base Conversions, Garbaged Program Recovery, and others.

Future utilities from Hollywood Hardware (including: Renumber, Append, Disk Diagnostics, etc.), and user programs are supported with a documented memory manager, and six open sockets totalling 24K of Rom expansion capabilities. Supplied with 75 page manual, quick reference guide, demo-disk, 30 day trail. Suggested retail price $190.00.

Hollywood Hardware, Inc., Dept. C/A, 6842 Valjean Ave., Van Nuys, CA 91406, (213) 989-1204. A.P.P.L.E. members may order from A.P.P.L.E. at special member price.

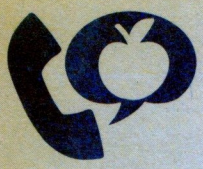
BRODERBUND'S "DROL" LAUNCHES GAMESTERS ON OUTER SPACE RESCUE

Never has there been such an amusing and unlikely collection of foes as in Broderbund's newest Apple Computer game DROL. DROL offers Apple gamesters plenty to cope with — from airborne turkeys that cook up into Thanksgiving roasts when you zap them, to overweight, hopping monsters that relentlessly toss lightning bolts, to scorpions, lizards, a magnet-tossing witchdoctor, and more.

Game players in DROL take on the task of pursuing a red-headed girl and her propeller-beanied brother who have wandered away from their mother. Mesmerized by the spell of a witch doctor, the children drift aimlessly through the scrolling underground corridors of an ancient civilization. A rocket backpack, protective laser gun, and wide-screen radar scope will prove indispensible as you frantically try to come to their rescue and reunite them with their mother.

Here is an odd-ball, extremely challenging rescue mission that could only take place in the out-of-this-world lunacy of DROL. Designed for the Apple][,][+, *//e* in 48K Disk format, DROL carries a suggested list price of $34.95 and is available now from Broderbund Software.

For more information on this and other Broderbund products, please contact Lois Levin, Director, Public Relations, Frank Barth, Inc., 500 Fifth Avenue, New York, NY 10110, (212) 398-0820.



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151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210

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2. More information on Apple PugetSound Program Library Exchange? A. ☐ Yes B. ☐ No

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Softerm 1
The Complete, Upgradeable Package for Home or Business Use

Softerm 1 is a powerful and flexible terminal emulation program that operates on an Apple® II, II Plus, or IIe to provide basic terminal communications to a variety of host computers, timesharing services, and information services such as *The Source*℠ *CompuServe® and the Dow Jones News/Retrieval®* It operates full or half-duplex at speeds up to 9600 bps using either a direct connection or any standard manual or auto-dial modem. Features include user-defined keyboard macros, built-in phone book for automatic dialing, terminal mode line capture simultaneously to print or disk, copy screen to print or disk, and terminal status display.

DOS, CP/M, and PASCAL File Compatibility Combined In a Single Program

Softerm 1 incorporates an advanced file manager which provides compatibility with DOS 3.3, CP/M, and Pascal disk formats for all file operations including file transfers. And at speeds up to 5 times faster than standard Apple DOS! Built-in disk utilities provide *INIT, CATALOG, RENAME,* and *DELETE* commands for all disk formats. Wildcard match characters can be used whenever filenames are entered.

Local file transfers allow DOS, CP/M, or Pascal files to be displayed, printed, or even copied to another disk. For example, a file on a CP/M formatted disk in Drive 1 could be copied to a Pascal formatted disk in Drive 2 providing a complete format conversion capability. Numerous editing options such as tab expansion and removing unwanted characters allow easy reformatting of data to accommodate the variations in data formats used by host computers.

Multi-Protocol File Transfer Capability

Softerm 1 offers file transfer methods flexible enough to match any host computer requirement. These include the *character* protocol with user-definable characteristics to provide maximum flexibility for text file transfers to any computer. The CP/M User's Group standard *XMODEM* protocol may be used for binary file transfers with systems using the CP/M operating system. The intelligent *Softrans* protocol can be used to transfer *any* type file and provides automatic binary encoding and decoding, error detection and automatic retransmission, and data compression to enhance line utilization. A FORTRAN 77 source program is supplied with Softerm 1 which is easily adaptable to any host computer to allow communications with Softerm using the Softrans protocol. Specific host computer versions of the Softrans FORTRAN program are available on request.

Softerm file transfer utilizes an easy to use *command language* which may be executed interactively or from a *macro* command file which has been previously entered and saved on disk. Twenty-three high-level commands include *DIAL, CATALOG, SEND, RECEIVE, ONERR, MONITOR, HANGUP,* and others. A *SCHEDULE* command even allows file transfers at a specific date and time.

Softerm 2
The "Choice of Professionals"

Softerm 2 includes all features of Softerm 1 and provides an *exact* terminal emulation for a wide range of conversational and block mode CRT terminals. Special function keys, sophisticated editing features, even local printer capabilities of the terminals emulated are fully supported. In fact, your host computer won't know the difference! *All* of the following emulations are included in Softerm 2 and the list is growing...

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For the latest program enhancements, you can access the Softronics Online Update Service 24 hours a day, 7 days a week. New hardware support or terminal emulations are immediately available to all Softerm users.

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RANDAMN's action takes place everywhere from the graveyard to Stonehenge and outer space, even to Satan's playground. It offers a fresh challenge due to the suspense and unpredictable action of its "Mystic Slot Machine".

For the Apple][,][+, *//e*. $34.95. An entertainment product of Magnum Software, 21115 Devonshire St., Suite 337, Chatsworth, CA 91311, (213) 700-0510.

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CheckMinder is a personal finance program designed for both business and personal use. It allows 999 expense categories, handles multiple accounts and produces a multitude or reports; all done with extremely rapid data entry. Another plus; the entire program resides in RAM which eliminates module loading and speeds up use. The program runs on the Apple][+, *//e*, and ///. CheckMinder retails for $69.95 and is available from Sleeping Bear Software, 1124 Fuhrman Road, Cincinnati, Ohio, 45215, (513) 769-0692.

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Expense Account Manager™ is the first microcomputer software package designed specifically to organize and track travel and entertainment expenses for the company executive and individual professional.

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The system is adaptive. The user can readily change the definitions of the expense items, budget lines and subtotals without any computer programming.

The Expense Account Manager is available on the Apple][Plus, and Apple *//e*. It requires 48K and 1 or 2 diskette drives and a printer. It can be purchased at computer stores for a suggested retail price of $150. For further information call Adaptive Software at (312) 831-4420.

WINEBUYS

The Wine Country Catalogue, called "WINEBUYS," the world's first electronic wine catalog, has been published on The Source™ data network by D'Vine Adventures, Santa Rosa, it was announced today.

WINEBUYS lists the finest California wines from Sonoma County, giving wine lovers worldwide direct access to the premium wines of almost 60 Sonoma County wineries — many of which are largely unavailable through traditional outlets outside Northern California.

To access the Wine Country Catalogue on The Source, users should type in the command string:

"WHOM;BASICV SFILES>STW127>WINEBUYS".

Orders can be entered into The Source computer and D'Vine Adventures, the publishers of the Wine Country Catalogue, offers 15 percent case discounts on all wines.

For more information, contact: D'Vine Adventures, 860 Piner Road, Unit 21, Santa Rosa, California 95401, or call (707) 526-9434. D'Vine Adventures can be reached on The Source electronic mail system by inputting the command "MAIL STW127".

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The Minute Manual For Apple Writer *//e* by Jim Pirisino is an easy user's guide for the most popular software program for the Apple *//e* computer, containing step by step instructions for the basic and advanced procedures. The Minute Manual unravels the mystery of the dot matrix printer by explaining how to access the printing commands for the top selling dot matrix printers, Epson FX and MX, Okidata 92, Gemini 10 and 10X, Prowriter, Apple, and NEC. The Minute Manual is designed to get you started using your computer to do word processing fast without needing to read computer, software and printer manuals. Minute Manual for Apple Writer *//e*, $7.95. Optional glossary disk containing commands for all of the dot matrix printers listed and a desktop reference chart, $9.95. Add $1 shipping per item order from MinuteWare.

MinuteWare, P.O. Box 2392, Columbia, MD 21045, (301) 995-1166.

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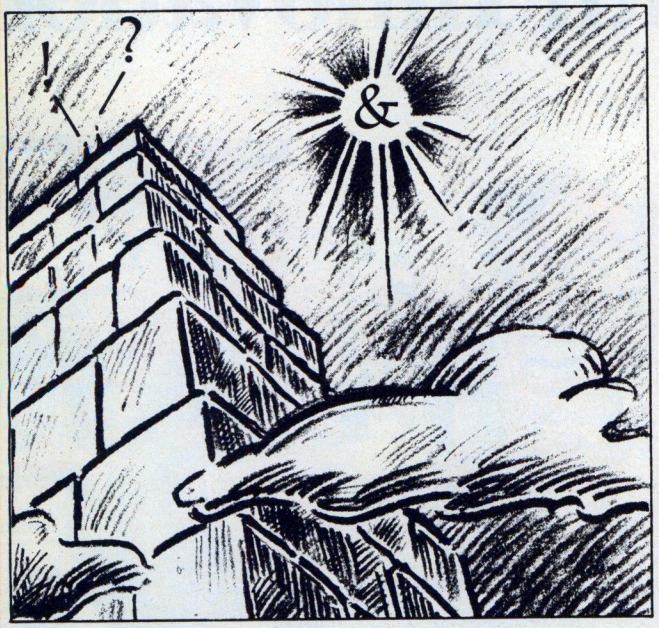

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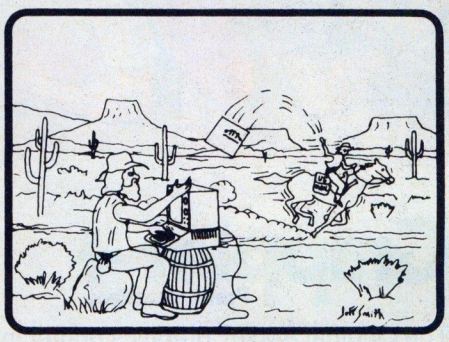

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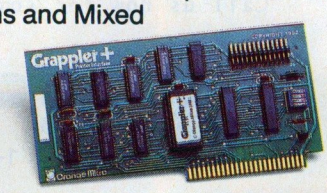

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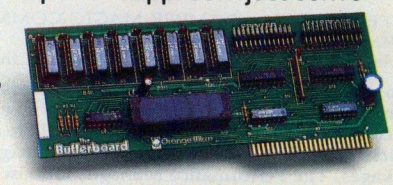

*Versions for standard Grappler + , Epson APL and Apple Parallel Interfaces.

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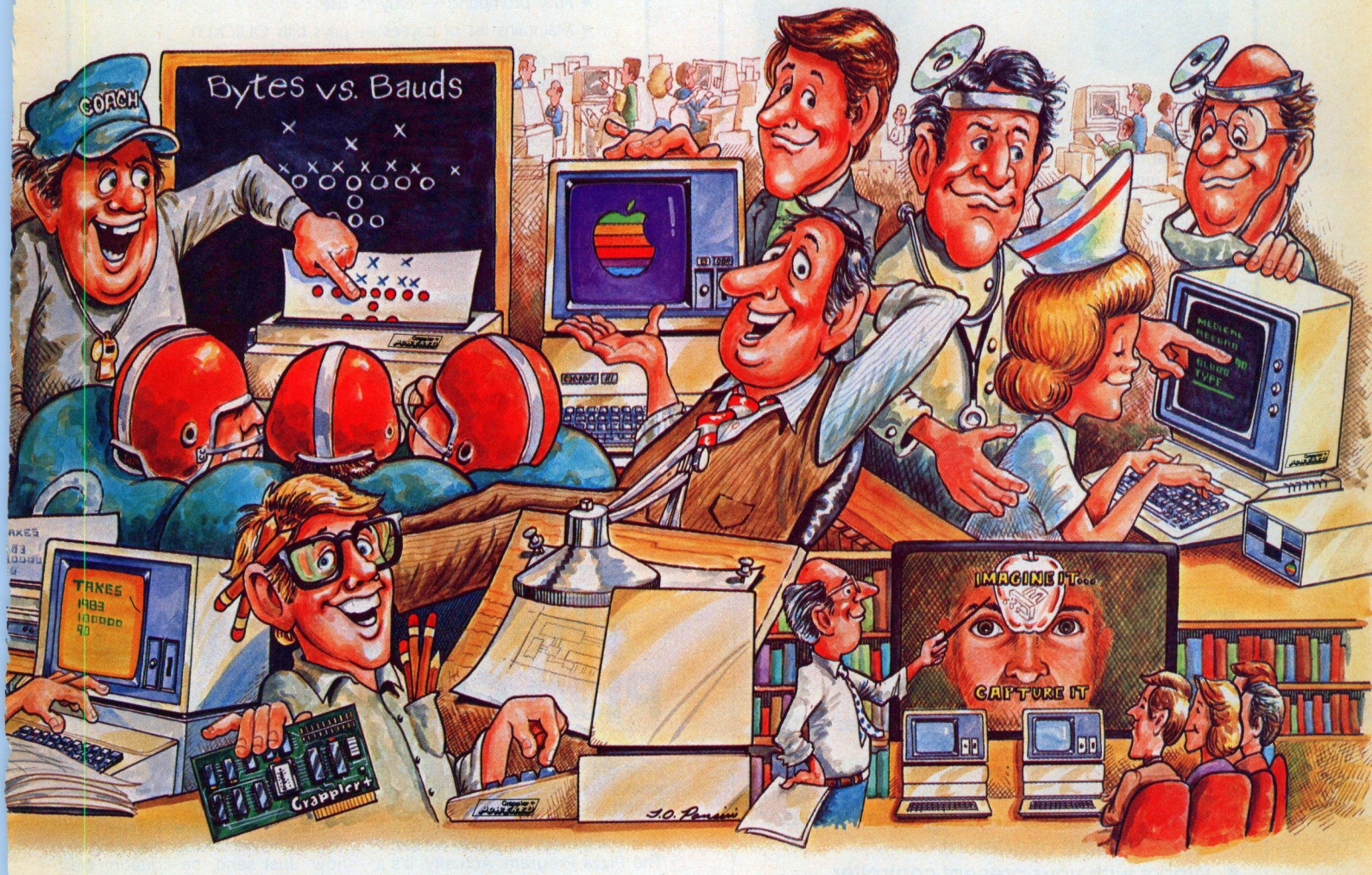

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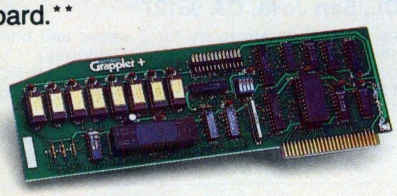

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ANOTHER APPROACH TO:

A MAGAZINE DATABASE

Clay Carr

THE May 1983 issue of *Call -A.P.P.L.E.* contained a magazine article data base program: "MAGFILER" by Jack Olivieri. Reading through it reminded me that I really needed to catalogue the computer magazines in my files. The question was how best to do it.

It appeared to me that I had at least four alternatives:

1) The obvious one was to use Magfiler. All I had to do was enter it from the magazine.
2) Alternative number two was to go out and buy a data base manager and load the magazine files on it.
3) In the September 1982 issue of *Creative Computing,* Mark Pelczarski presented "A Modular Data Base." I had copied this article, modified the data base system, and used it. I could just load the magazine article data base into it.
4) Finally, as Lee Reynolds pointed out way back in *Call -A.P.P.L.E.* for May 1981, one can use "A Text Editor as a DB Management System." Since I have some four different word processors/text editors, I could use one of them to create my data base.

Alternative #1 (using Magfiler) was an acceptable one, but it had two drawbacks. First, I would have to copy the program and debug it. Second, it did not have a provision for key words.

So, I looked at alternative #2 — buy a data base program. It was acceptable, too, but the most expensive of the group.

Alternative #3, the Pelczarski data base, was already in hand, and I was familiar with it. Obviously, it would do. It did suffer from a mildly complex search procedure, and neither the search nor the sort were particularly fast.

So, that brought me to alternative #4 — use a text editor or word processor. I recently purchased a very effective word processor for the Apple — *Screenwriter II.* One drawback of the *Screenwriter,* however, is its relatively slow search function — especially which multiple searches for the same string.

Before I got *Screenwriter,* I had used Southwestern Data Systems' *Correspondent* for some time. I eventually switched because of some limitations of the system -particularly its lack of keyboard speed. But I did remember that it had an exceptionally fast search routine, and could carry the search through multiple files.

That began to whet my appetite. I wanted to use key words for each article, but a data base system presented something of a quandry here. If the word appeared in the title, I either had to leave it out as a key word and search both the title and key word fields, or take up an unnecessary space to include it as a key word. With a word processor, I could forget it as a key word, since the title got searched right along with the key words.

To make a long story short, I decided to use *The Correspondent* as the data base. For anyone interested, this is how I organized the files:

1) Each year of the magazines I commonly get — such as *Call -A.P.P.L.E.* — is a separate file. The magazine and year are at the top of the file, and also before each separate month. This way, when I'm searching multiple files I can keep track of where I am without having to repeat the magazine and year over and over.
2) Each entry has at least two lines, and each is 40 characters long. The reason for the 40-character line is simple: this way the entire entry is on the screen at the same time.
3) The entry begins with the name of the article. Up to 40 spaces are available for this, so I often stick in comments or elaborations on the title line (see below).
4) The next line is indented one space for readability. The first entry is the month (in three characters), followed by the page the article is on. (For my purposes, I don't need the author's name; I can look it up when I check out the article).
5) This leaves 30 spaces for keywords. In general, there are tab stops at 20, 30 and 40 for the key words. Part of the nice flexibility of the word processor, though, is that I can contract or expand space as necessary without fouling up anything. I can also add an extra line or two if I feel the article needs a comment.

The result has been a data base that fits my needs nicely. Just to give you a sample of what it looks like, here are a few entries chosen at random:

CALL -A.P.P.L.E. - 1981

DATA STORAGE TECHNIQUES
JAN 35 DOS/DISK FILES

BSAVING & BLOADING ARRAYS IN INTEGER
JAN 58 BASIC & APLSFT SPEED ROUTINES

MOVING SIGNS
FEB 40 CRAWLER EFFECTS TEXT

A PROGRAMMER'S DELIGHT
FEB 48 REVIEW UTILITY

FIVE VIDEO BOARDS IN REVIEW
(DOUBLEVIM/A 23 SION/ VIDEOTERM/SMARTERN/SUP' R'TERMINAL FULL VIEW 80)

THE APPLE II MONITORS PEELED
MAY 46 BOOK REVIEW

WRITE-APPLE: PROTECT PGM FROM CHANGE
MAY 49 UTILITY (SETS 1ST LINE = 65535)

ALCHEMY AND OTHER WONDERS
MAY 61 ROUTINE DISK/DOS (FINDS LENGTH OF RANDOM-ACCESS FILE)

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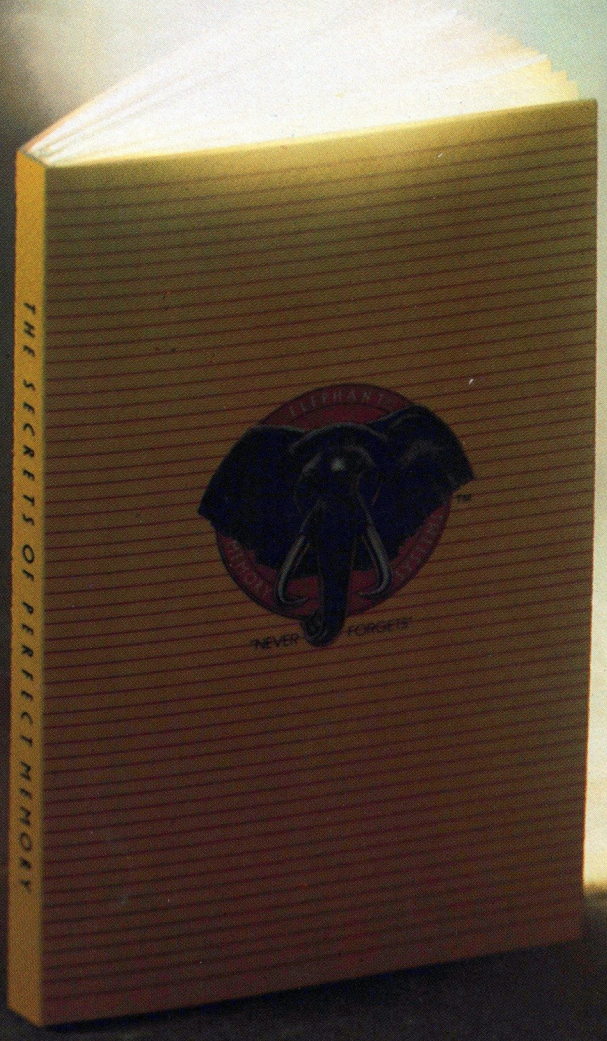

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